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# PROCEDURAL TREATMENT OPTIONS TO ADDRESS INTERMITTENT PENTACHLOROPHENOL EFFLUENT EXCEEDANCES AT A FORMER WOOD-TREATMENT SITE IN BUTTE, MONTANA

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PROCEDURAL TREATMENT OPTIONS TO ADDRESS INTERMITTENT  
PENTACHLOROPHENOL EFFLUENT EXCEEDANCES AT A FORMER  
WOOD-TREATMENT SITE IN BUTTE, MONTANA

By  
Travis Dunkle

A thesis submitted in partial fulfillment of the  
requirements for the degree of

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## **Abstract**

The Montana Pole and Treating Plant in Butte, Montana treated wood with preservatives, mainly pentachlorophenol (PCP), which had been dissolved in a carrier fluid. Accidents and careless handling spilled large quantities of the fluid on the site, contaminating the vadose zone and groundwater. This site has been undergoing remediation since it was added to the CERCLA National Priorities List in 1987. Pentachlorophenol and dioxin are the contaminants of concern. Remediation technologies have included soil removal and installation of two water recovery trenches that collect groundwater, which is then pumped through a granular activated carbon (GAC) water treatment system. There were 22 exceedances of the 1 ppb treatment standard from 2003-2014. This thesis assigns a possible cause for each exceedance. Possible causes were determined to be due to normal plant operational procedures (18 exceedances), accidents (three exceedances), and climatic effects (one exceedance). The normal procedure of backwashing both carbon vessel trains on the same day was the possible cause, or one of two causes, for nine of the exceedances. It was recommended that only one of the two GAC vessel trains be backwashed at a time. Events that flushed the vadose zone, which increased PCP concentrations in the influent to the GAC vessels, were implicated in twelve of the exceedances. These events were normal plant operations (shutting down pumps during plant upgrades and rapid onsets of carbon bed exhaustion before the carbon could be replaced), accidents (a power outage and two water main breaks), and infiltration of storm water from off site during a heavy rainfall. Recommendations for counteracting the causes were made that should reduce the number of effluent quality exceedances.

**Keywords:** Montana Pole and Treating Plant, activated carbon, pentachlorophenol, groundwater treatment

## **Acknowledgements**

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## **1. Introduction**

Groundwater at the Montana Pole and Treating Plant (MPTP) site in Butte, Montana is contaminated with pentachlorophenol (PCP) and is currently (2016) treated through an activated carbon treatment system. Standards for treatment are required to be met under the Record of Decision (ROD) implemented by the Montana Department of Environmental Quality (MDEQ). Thirty exceedances of the treatment standard in MPTP effluent have been recorded between 2000 and 2014. The objective of this thesis is to examine exceedances for patterns and causes then recommend methods to prevent future exceedances.

## 2. Background

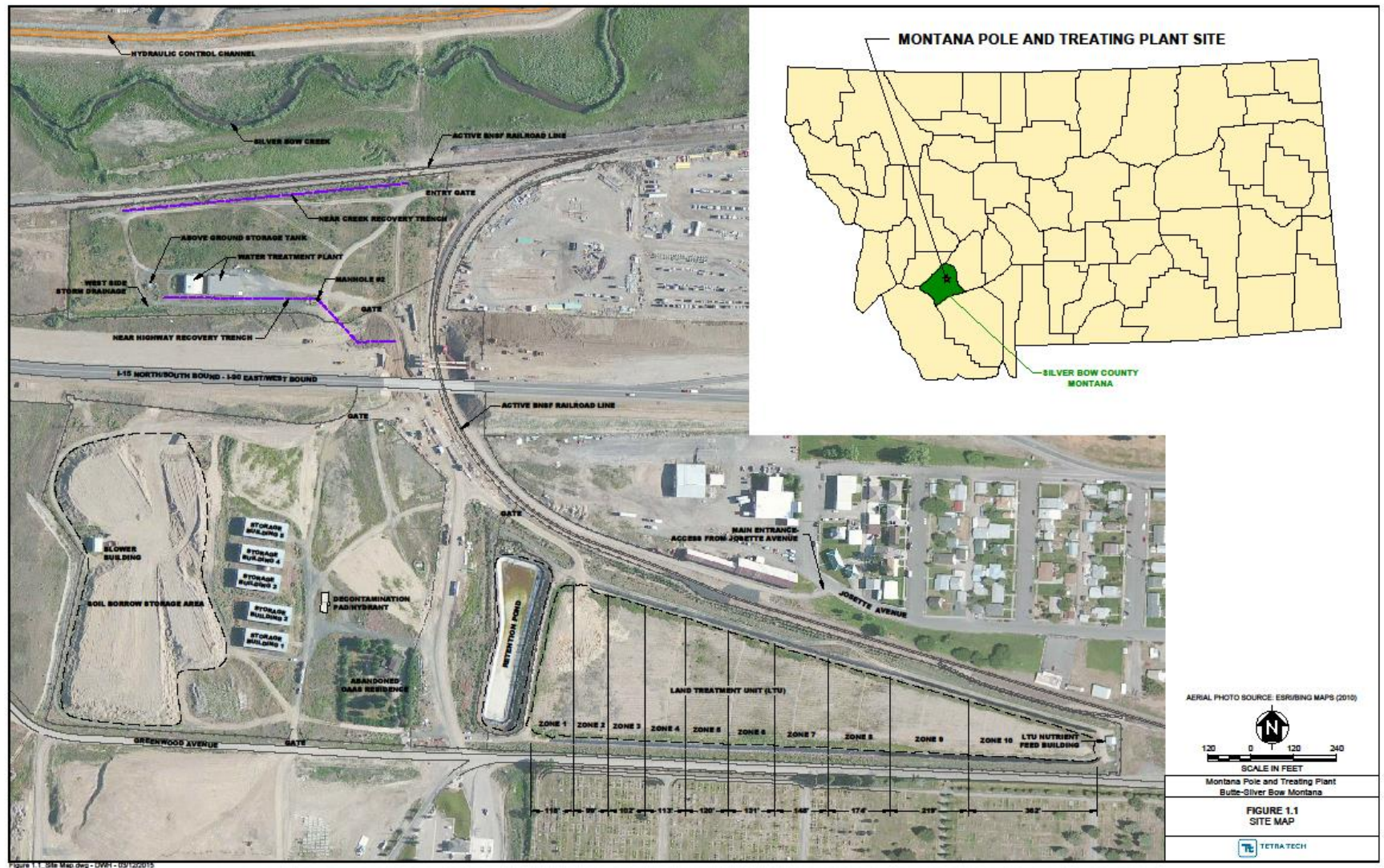
### 2.1. Site History

The MPTP is located in Butte, Montana on West Greenwood Ave. The site is divided by I-15/90, which runs across site in east-west direction (Figure 1). Opened in 1946, MPTP (formerly named the Montana Pole Plant) used a solution containing 5% PCP mixed with a petroleum carrier oil similar to diesel to preserve poles, posts, and bridge timbers. The PCP solution was applied to wood products in butt vats and pressure cylinders retorts. Butt vats are containers use to treat the lower portion of poles with PCP as a preservative, while pressure cylinders retorts treat entire poles by use of steam to facilitate the absorption of PCP as a preservative. Creosote was used as wood preservative during part of 1969. An explosion of the east butt-treating vat caused a fire that destroyed the east vat, boiler room, and retort building in May of 1969 (MDEQ, 2011). PCP contaminated oil began to infiltrate into the groundwater and seep into Silver Bow Creek (MDHES, 1993). In March of 1983, a citizen complained of oil seeping into Silver Bow Creek near the MPTP site. The MDEQ (then the Montana Department of Health and Environmental Services, MDHES), investigated the complaint and discovered oil seeping from the south into Silver Bow Creek. An additional DEQ investigation discovered oil-saturated soils adjacent to the creek and on the Montana Pole and Treating Plant property. Soil samples revealed the presence of PCP, polynuclear aromatic hydrocarbons, and dioxins and furans in site soil (MDEQ, 2011).

The oily wood-treating fluid containing PCP percolated downwards, contaminating soil it passed through before entering the groundwater (MDHES, 1993). Organic compounds in the fluid either adsorbed to soil particles above the water table, floated upon the groundwater in non-aqueous phase, or dissolved into groundwater. Groundwater containing PCP migrated

downgradient in a northerly direction towards and eventually into Silver Bow Creek. PCP concentrations in groundwater produced an excessive risk to human health and prevented the groundwater from being used since it did not meet quality standards acceptable for public use (MDHES, 1993).

The MPTP was proposed for addition to the Environmental Protection Agency's (EPA) Superfund National Priorities List in 1986. In 1987, the MPTP was added to the National Priorities List due to the presence of PCP contaminated wood-treatment fluids entering the groundwater (MDEQ, 2011).



**Figure 1: General location map of the MPTP Site, Butte, Montana (Adapted from Tetra Tech, 2015)**

## 2.2. Environmental Concerns

Dioxins and polycyclic aromatic hydrocarbons (PAHs) have been detected in groundwater at the MPTP along with PCP. All three of these groups of compounds are probable human carcinogens and dangerous to the general public (EPA, 2015a). Short term exposure to PCP can cause harmful effects to the liver, kidneys, blood, lungs, nervous system, immune systems, and gastrointestinal tract (EPA, 2015a). Symptoms can include increased temperature, profuse sweating, uncoordinated movement, muscle twitching, and possibly a comatose state. Direct contact with PCP can irritate the skin, eyes, and mouth. Chronic exposure to low levels such as at a workplace can cause damage to the liver, kidney, blood, and nervous systems. The carcinogenic effects of PCP are not highly documented for humans and thus it is classified as a B2 (probable human carcinogen). PCP has been associated with renal and neurological effects as well.

Short term exposure to dioxins can produce skin lesions, such as chloracne and patchy darkening of the skin, and altered liver function in humans (EPA, 2015a). Long term exposure to dioxins has been linked to impairment of the immune, developing nervous, endocrine, and reproductive systems. Dioxin has been classified as a known human carcinogen but it does not affect genetic material so there is a threshold below which cancer risk is negligible (EPA, 2015b). The dioxins were probably contaminants formed during PCP synthesis, and were brought to the site mixed in with the PCP.

Polycyclic aromatic hydrocarbons are organic compounds containing two or more benzene rings, with two or more of the benzene rings sharing two carbon atoms. Short term exposure effects have not been documented for humans but long term exposure can produce skin

disorders (EPA, 2016). The PAHs present at the MPTP site were probably byproducts of the production of PCP, like dioxins.

Concentrations of dioxins and PAHs are monitored but no action levels for them are enforced. Therefore, their concentrations in MPTP groundwater do not affect normal plant operation. Normal operation, such as replacement of exhausted activated carbon, is dictated solely by effluent PCP concentrations.

### **2.3. Remediation Efforts**

The Emergency Response branch of the EPA started excavating contaminated soil to reduce the contamination of Silver Bow Creek and begin remediation of the site in July 1985. Approximately 6,000 cubic yards of heavily contaminated soil was removed and stored in pole barns. Two groundwater interception/oil recovery systems were installed to capture oil and prevent its migration to Silver Bow Creek (MDEQ, 2011). A fence was installed around the perimeter of the contaminated areas to protect the general public from entering the site.

The MDHES, under permission from the EPA, conducted a potentially responsible party administrative order negotiation and issuance in 1989. The next year, Atlantic Richfield Company agreed to conduct a remedial investigation and feasibility study of the site. During the remedial investigation a light nonaqueous phase liquid (LNAPL, meaning floating oil) at the groundwater table was discovered, and the EPA proposed additional removal to control the oil in June, 1992.

The recovery system that is currently in operation replaced the original system from 1985 and LNAPL recovery system installed in 1993. The current system was installed in 1996 and includes two recovery trenches. The Near Highway Recovery Trench (NHRT), located directly south of the WTP building, runs alongside the I-15/90 for 800 feet (Figure 2) and has an approximate depth of 22 feet. In 2009, construction on the interstate overpass caused

approximately 120 feet of the east-most section of the NHRT and the recovery pump on the east end to be abandoned. The remaining recovery pump, located east of the WTP building, continued the capture of contaminated water. The Near Creek Recovery Trench (NCRT) laying along the northern fence is 900 feet long with an approximate depth of 25 feet (Figure 2). A recovery pump was installed at the center of this trench to collect contaminated water. Water captured by both trench systems feeds into the WTP where it undergoes treatment by granular activated carbon (Figure 3).

There are six phases in the remediation of the MPTP site. Three of these phases have been completed, two are ongoing, and one will be implemented in the future. Activities in the first remedial phase were described in a ROD that was issued in 1993. The primary components of the first phase consisted of constructing a land treatment unit (LTU) for soil bioremediation, a retention pond to capture LTU runoff, 13 soil staging and pretreatment piles, an addition to the water treatment plant, and two contaminated groundwater recovery trenches. Additionally, a previously-installed groundwater recovery system was removed, and the contaminated soils north of I-15/90 were excavated (Tetra Tech, 2015).

During the second remedial phase, which was implemented in 1999, hazardous and non-hazardous wastes that remained on the site were sent to appropriate waste disposal facilities. The waste was incinerated or placed in appropriate landfills.

The third phase of remediation consisted of moving soil that was placed on the LTU during phase one to the north side of the site, placing contaminated soil excavated from south of I-15/90 onto the LTU ,and installation of north and south side infiltration systems. Constructed in 2000, the south side infiltration system was operated continuously from late 2001 to the end of 2002, but its use has declined over time as PCP concentrations in the groundwater have dropped

significantly (Tetra Tech, 2015). The north side infiltration system has not been used since it was tested in 2000.

Phase four is still in progress. It involves pumping groundwater through a granular activated carbon (GAC) treatment system. Contaminated soil on the LTU is treated through natural degradation of PCP and dioxin through exposure to the environment.

Phase five is designed to address the contaminated soils present under I-15/90 and will be accomplished in the future. Phase six consists of the removal and disposal of the soil treatment facilities on the south side of the site and preparation the south side of the site for reuse. Phase six began with the removal of the soil treatment piles in 2004 and will conclude with the placement of LTU soil to a low area south of I-15/90.

Some of the remedial equipment, such as the oil-water separator, influent sumps, and nutrient feed systems, have been shut down because LNAPL has not been detected in the recovery trenches for several years; DEQ granted permission to shutdown systems that were no longer needed. After completion of remediation efforts over the next several years, the LTU will be removed and the portion of the site south of I-15/90 will probably be turned over to the Silver Bow County.

The contaminated plume of groundwater is being contained on the site through pumping water from the two recovery trenches to the GAC treatment system. In 2014, the flow rate recovered from the trenches ranged from 221 gallons per minute (gpm) to 390 gpm with an average of 297 gpm (Figure 4). An estimated 156,518,200 gallons of groundwater was treated in 2014 (Tetra Tech, 2014). The pumping rate is controlled by the site operators. Pumping rates are selected based on the groundwater elevation, because the pumps must remain submerged or they will suffer damage due to cavitation. Should water levels rise too high, the groundwater table



enters what had been the vadose zone. Also, a high water table may create a gradient where the elevation of the water table would be higher in the site than outside of the site, so contaminated groundwater would percolate out of the site. The intent is to have the groundwater table slope downward to the recovery trenches, so it can be pumped and treated before it leaves the site. Pumping rates have been adjusted in a way that the pumps remain submerged, the vadose zone was not flooded, and groundwater capture was maintained. Seasonal groundwater elevations are the major factor in pumping rates. However, external effects such as the groundwater table depression caused by dewatering, the Butte-Metro Wastewater Treatment Plant site while improvements were being installed, in the fourth quarter of 2014, demanded increased pumping rates to lower the water table so that the contaminant plume did not escape from the site. Treated effluent is discharged to Silver Bow Creek. The ROD requires that the PCP concentration in the effluent not exceed 1 part per billion (ppb).

The chosen technology for treating contaminated groundwater was to treat it with granular activated carbon (GAC) adsorption (MDHES, 1993). Granular activated carbon can adsorb PCP from water down to a low residual concentration. Activated carbon is any organic material with a high carbon content that is treated with high temperature steam to create submicroscopic pores where adsorption occurs. The MPTP uses GAC generated from coconut shells which are well suited for organic chemical adsorption for substances such as PCP. Coconut shell carbon also has the highest hardness of activated carbons making it ideal for water treatment (Potwara, 2012). Four 7000 pound carbon vessels are used at the MPTP in two vessel series with both series running in parallel.

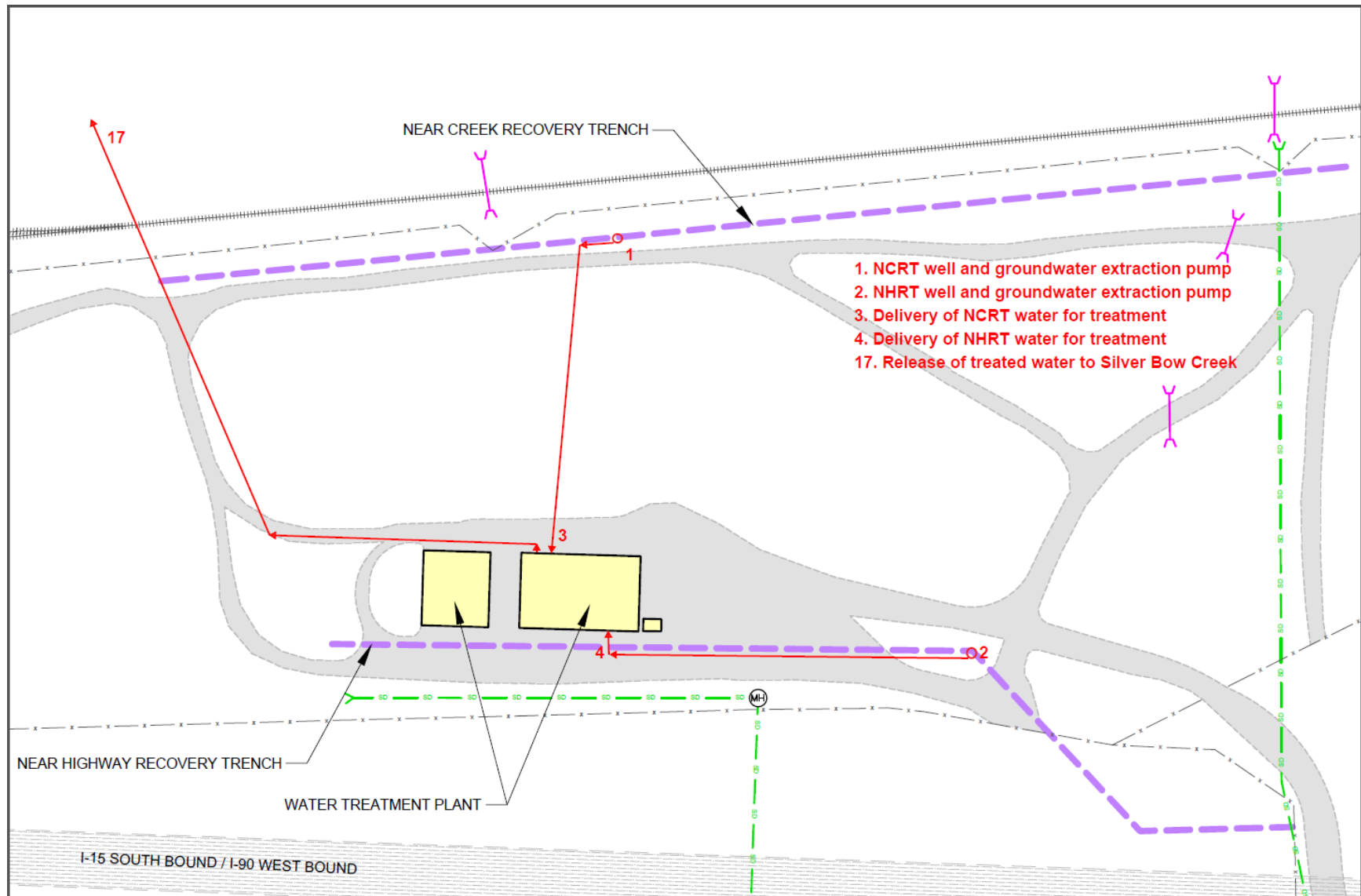


Figure 2: Detailed map of the MPTP site north of Interstate I-15/90 (Adapted from Tetra Tech, 2015)

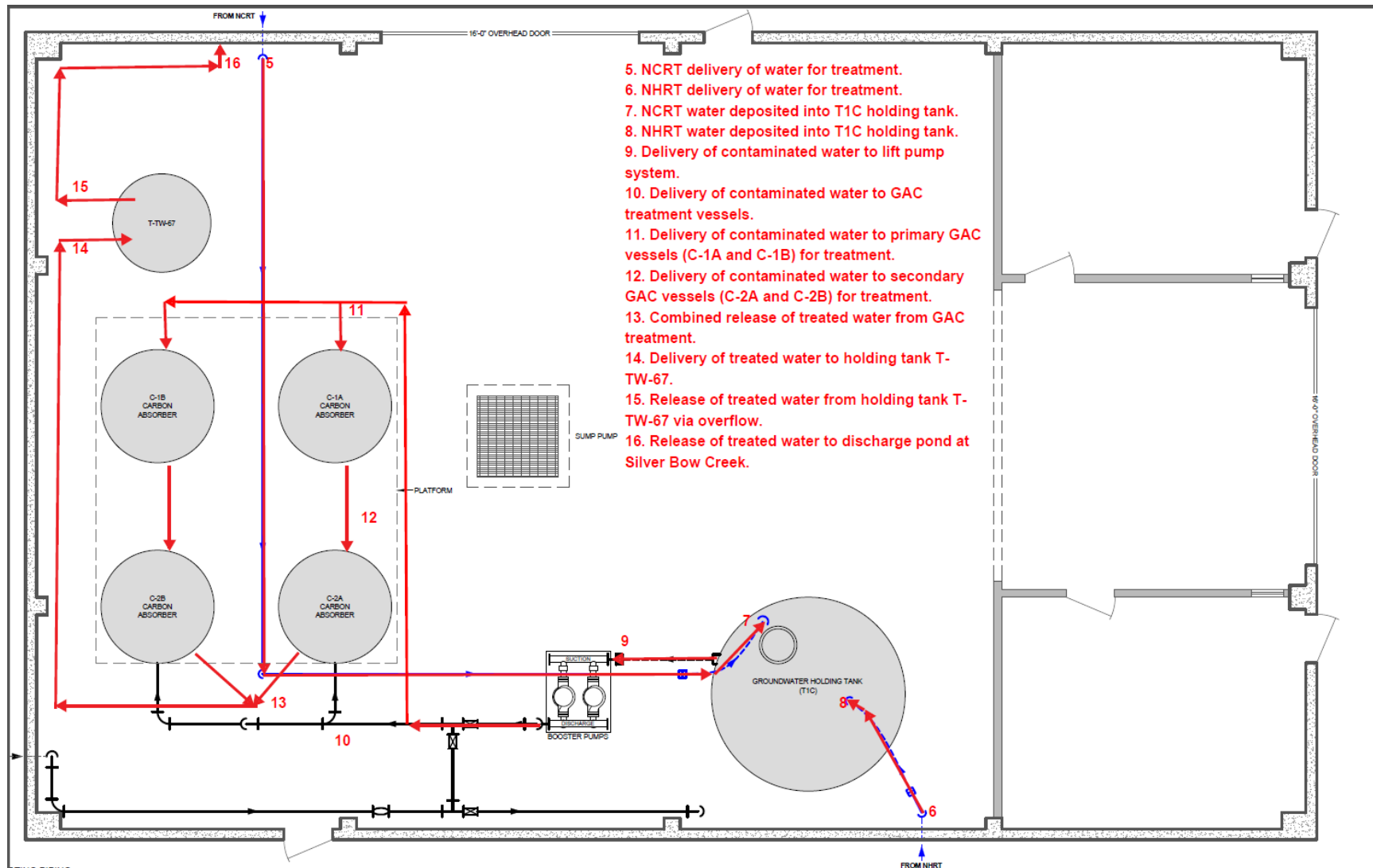
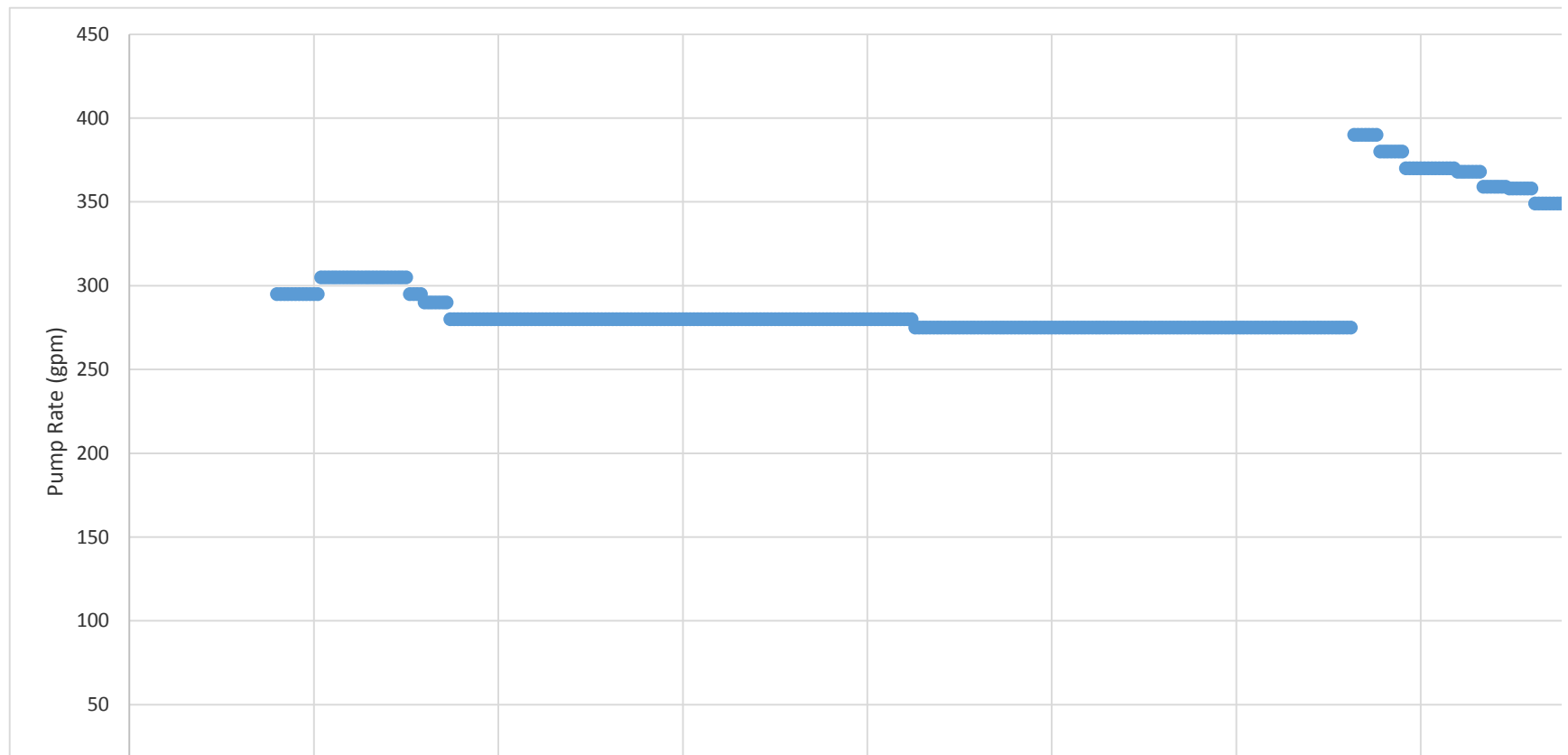


Figure 3: Detailed map of MPTP treatment plant building (Adapted from Tetra Tech, 2015)



### **3. Purpose and Scope**

The MDEQ regulations require that effluent to Silver Bow Creek from the MPTP meets the 1 ppb standard for PCP. Exceedances of the PCP effluent standard have occurred 30 times at this site since 2000. This thesis investigates possible causes of the exceedances, and makes recommendations on changes to plant operation in order to reduce the number of exceedances in the future.

## 4. Methods

This thesis is based on the interpretation of existing data collected at the MPTP. Pentachlorophenol concentrations and groundwater elevations were obtained from Tetra Tech (Tetra Tech, 2015). Precipitation data was obtained from the records of the weather station at the Bert Mooney Butte-Silver Bow airport (U. S. Climate Data, 2016).

Groundwater elevations were monitored on a monthly basis with a hand tape at each well by the plant operator (Tom Bowler, Tetra Tech) to track site conditions. Groundwater elevation data used in this thesis were restricted to wells directly surrounding the recovery trenches and from within the recovery trenches to focus on data related to the water quantity and quality pumped to the GAC system.

Water chemistry samples were taken by the plant operators (Tom Bowler and Travis Dunkle, Tetra Tech) of influent to the GAC vessels, between the GAC vessels (“BABB” samples), and effluent from the GAC vessels. The two recovery trenches were each sampled on a monthly basis. Samples from the GAC system (Figure 5) were collected weekly, with the analyses done by the laboratory of the Montana Bureau of Mines and Geology (MBMG). Three additional samples are taken every two weeks for quality assurance reasons: (1) a duplicate of one of the weekly samples, (2) a blind sample taken to check the lab methods, and (3) a blank sample. The blank and blind samples were taken on separate weeks of the cycle and selected at random during sampling. One is arbitrarily labeled OPO and is taken the first week of the two week cycle; it is either a blank sample of deionized water or is a blind sample from one of the usual sampling points. During the second week of the cycle, the quality assurance sample was the quality assurance sample not chosen in the first week. For example, if the quality assurance sample in the first week of the cycle was a deionized water blank, the quality assurance sample

in the second week of the cycle was a blind sample from the GAC system. The results of these analyses are given in Appendix B.

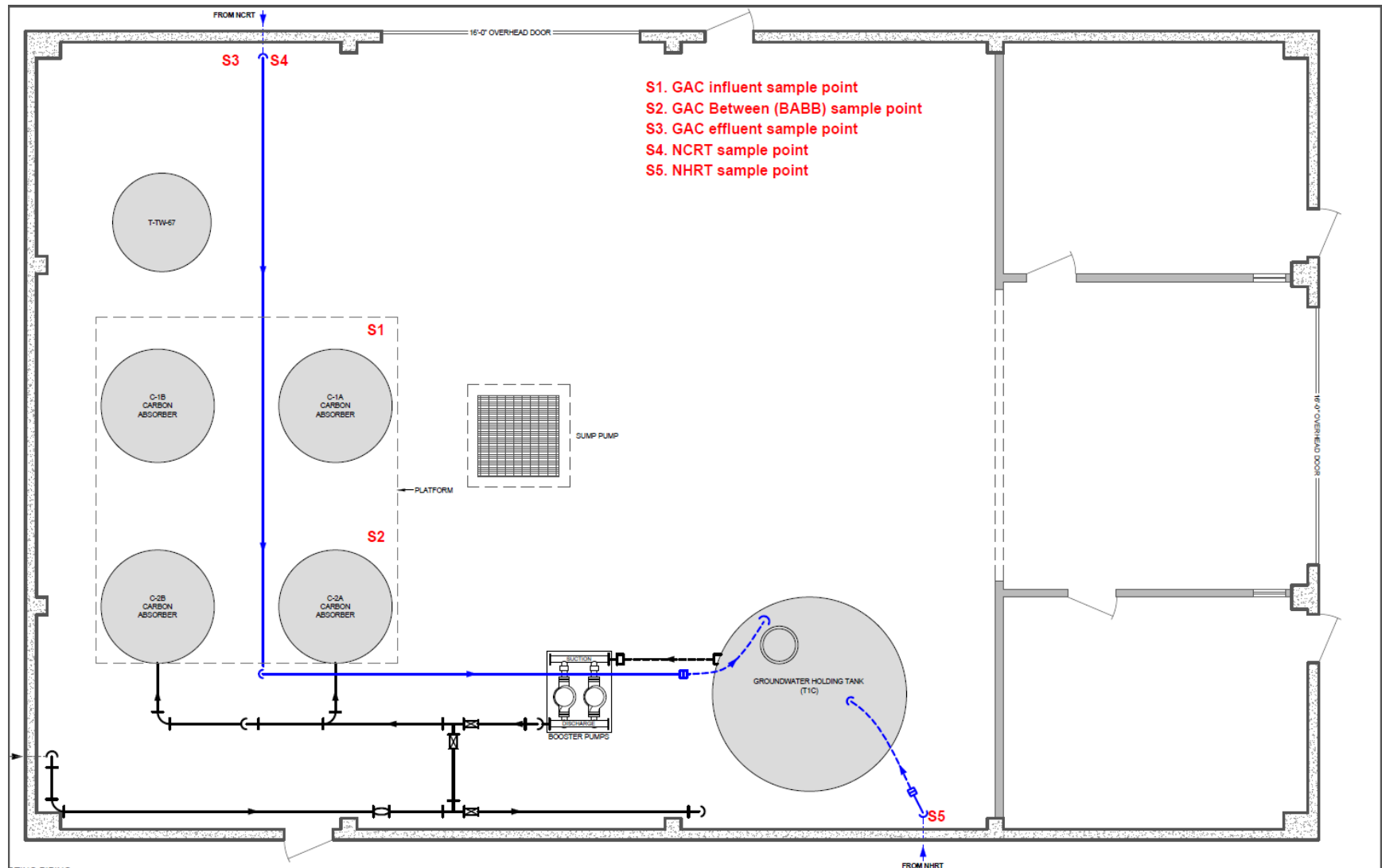


Figure 5: Established sampling points for MPTP weekly samples (Adapted from Tetra Tech, 2015)

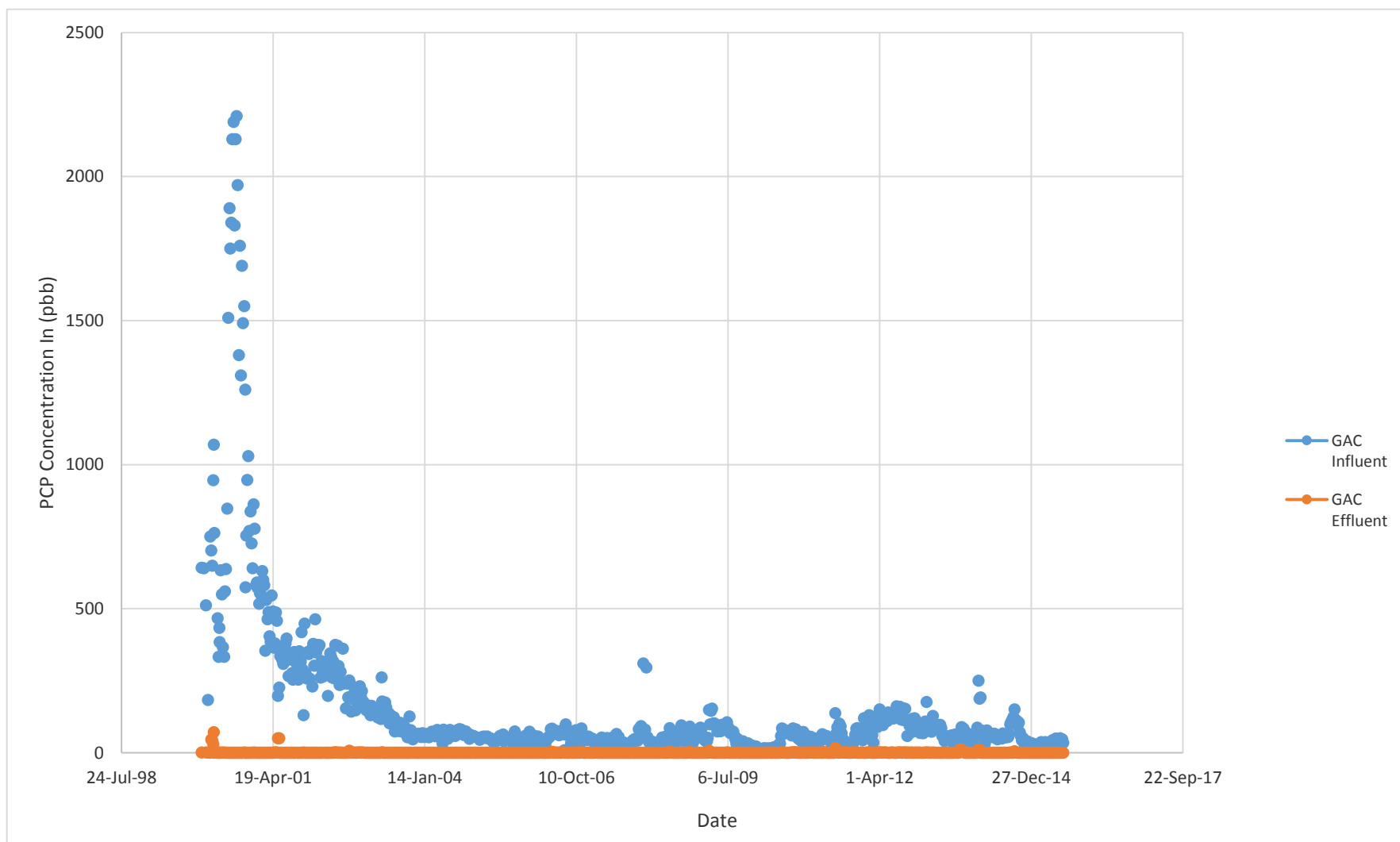


## 5. Data Analysis

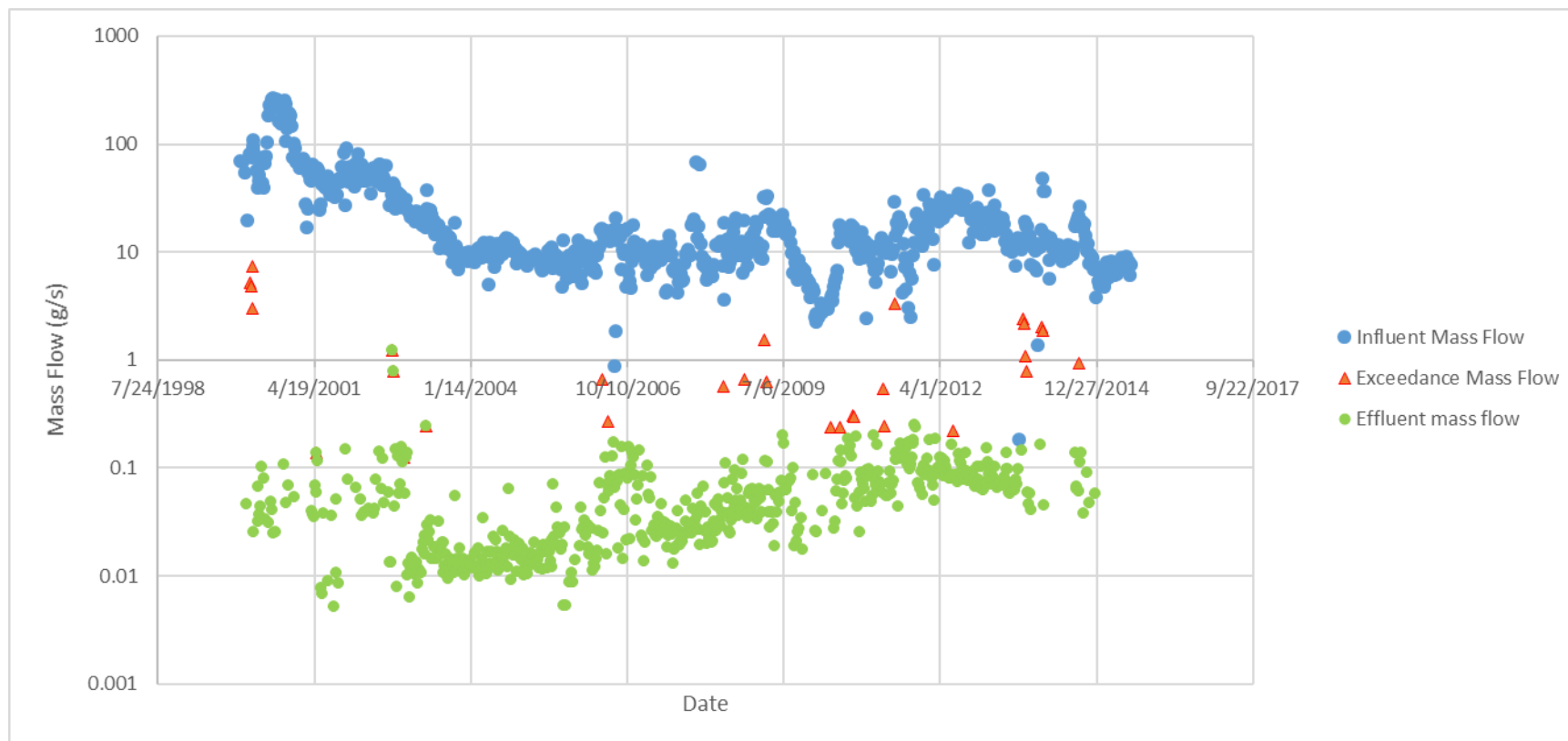
All climatic, groundwater elevation, and water-chemistry data from MPTP operations for the years 2000 to 2015 were combined into a single spreadsheet to analyze correlations of multiple data sources; this combined data is included Appendix A. Evaluation of this data was focused on PCP effluent exceedances of greater than 1 ppb and various parameters that could have direct effects on the treatment process. Figure 6 displays the influent and effluent PCP concentrations over the entire 15 years. Influent PCP mass flow rates were considered as an alternative evaluation to concentrations but the pattern of the mass flows was almost identical to the pattern of the concentrations because the flow rates to the GAC system were relatively constant (Figure 7). Thus, the influent PCP mass flow rates provided no new insight to the causes of the exceedances.

Influent PCP concentrations from 2000 till the end of 2002 were high compared to the concentrations of later years, ranging from 150 to 2000 ppb (Figure 6). The eight exceedances that occurred during that period were considered atypical of current conditions due to the relatively high PCP concentrations. PCP concentrations have greatly declined since 2002, as the highest levels of contamination were treated down to the current conditions with an average PCP concentration of 64 ppb for the years of 2003 to 2014 (Figure 6 and Appendix A). Therefore, the data that was analyzed covers the period from 2003 through 2014. Conditions that may have caused each exceedance where PCP concentrations exceeded 1 ppb were evaluated individually. Potential causes for each exceedance were determined through graphical analysis of effluent concentrations compared to influent concentrations, precipitation, groundwater levels, and flow rates. Three classifications of the exceedances became evident as causes were determined:

normal plant operations, unforeseeable accidents, and climatic effects. Each type of exceedance is examined in Section 6 and recommendations for preventing future exceedances are provided.



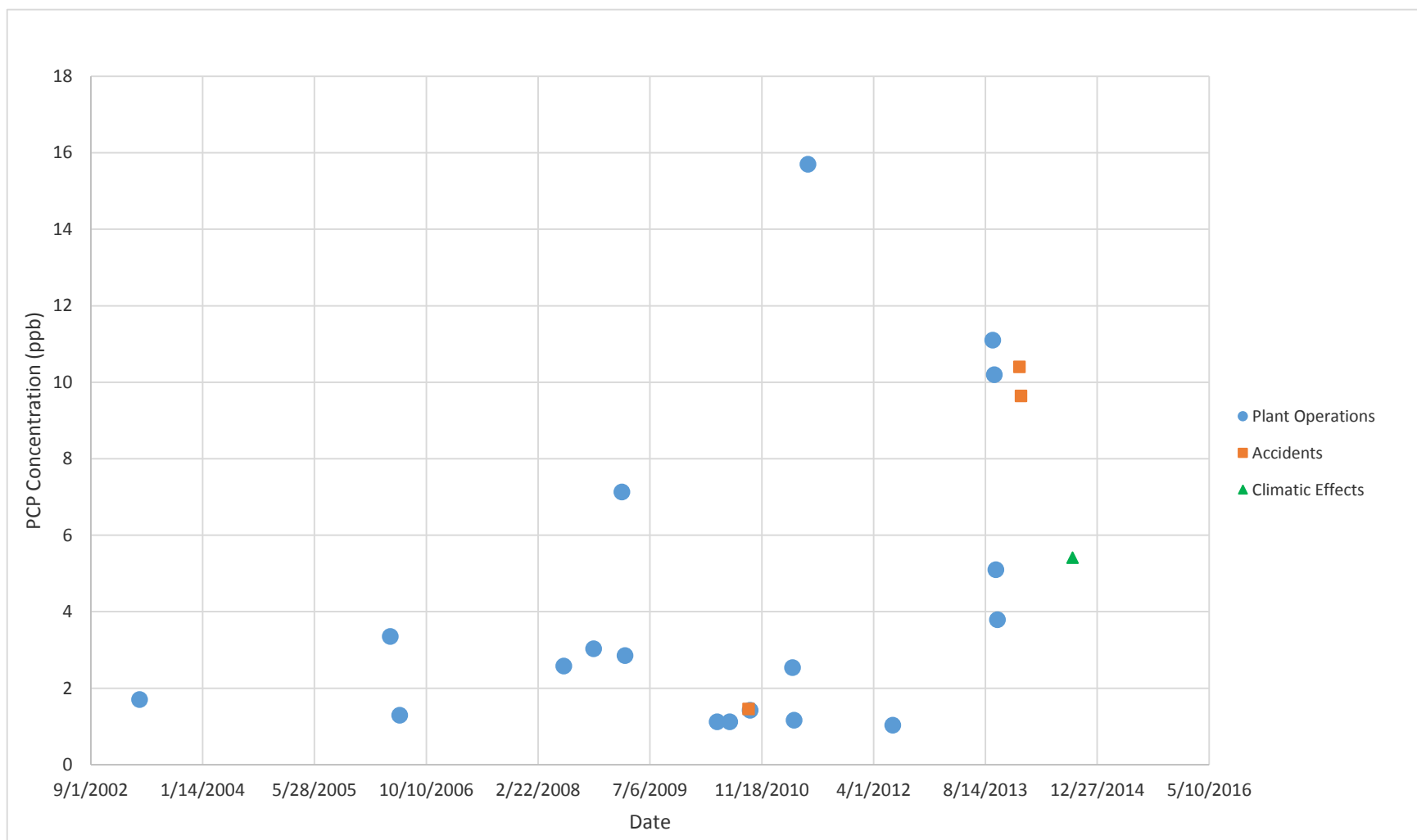
**Figure 6: PCP concentrations of GAC influent and effluent at the Montana Pole and Treating Plant, Butte, Montana 2000 to 2014**



**Figure 7: PCP mass flow of GAC influent, effluent, and exceedances at the MPTP Butte, Montana 2000 to 2014**

## **6. Results and Recommendations**

Over the course of plant operations from 2003 to 2015, there were 22 PCP exceedances in the effluent (Figure 8). As discussed in Section 5, the exceedances were separated into three classifications -normal plant operations, plant accidents, and climatic effects - based on the available data. There may have been other causes that were not evident due to them not being observed or recorded. Some of the exceedances attributed to a single cause may have been due to the synergistic effects of more than one cause because there may have been contributing causes that were not identified in the available data. Recommendations to prevent further exceedances due to the three suspected causes are discussed below.



**Figure 8: PCP exceedance at the MPTP with factors that potentially affected those exceedances including plant operations, onsite accidents, and climate effects**

## 6.1. Normal Plant Operations

Eighteen of the 22 reported exceedances of PCP in the plant effluent were interpreted as being caused by normal plant operation procedures. Table I lists these 18 exceedances and their potential causes. All plant operation procedures related exceedances are displayed in Figure 8 with date and concentration.

**Table I:** Pentachlorophenol exceedances in the activated carbon system effluent and potential causes of treatment failures at the Montana Pole and Treating Plant, Butte, Montana 2003 to 2014

Date	PCP (ppb)	Potential cause for PCP effluent exceedance
4/7/2003	1.7	Backwashing and pumping highly contaminated water from the retention pond
5/2/2006	3.35	NHRT pump down during a plant upgrade
6/13/2006	1.29	NHRT pump down during a plant upgrade
6/16/2008	2.58	Backwashing
10/27/2008	3.03	NHRT pump down during a plant upgrade
3/2/2009	7.13	Injection of water into the south side infiltration system causing a rapid influent PCP concentration increase
3/16/2009	2.85	Backwashing
5/3/2010	1.12	Backwashing
6/28/2010	1.12	Backwashing
9/27/2010	1.42	Backwashing
4/4/2011	5.54	Backwashing
4/11/2011	1.16	Backwashing
6/13/2011	15.7	Pumping highly contaminated retention pond water directly into the treatment plant after high precipitation
6/25/2012	1.03	Pumping highly contaminated retention pond water directly into the treatment plant after high precipitation
9/16/2013	11.1	Carbon exhaustion exacerbated by a precipitation-caused increase in influent PCP concentrations
9/23/2013	10.2	Carbon exhaustion exacerbated by a precipitation-caused increase in influent PCP concentrations
9/30/2013	5.1	Carbon exhaustion exacerbated by a precipitation-caused increase in influent PCP concentrations
10/7/2013	3.79	Carbon exhaustion exacerbated by a precipitation-caused increase in influent PCP concentrations

Maximum allowable effluent concentration = 1 ppb (MDHES 1993)

NHRT = Near Highway Recovery Trench

Based on the timing of the reported effluent exceedances, nine of the exceedances occurred immediately after backwashing events (Figure 9). They were apparently caused by

backwashing the GAC vessels. Backwashing was initiated manually when the influent pressure to the primary GAC vessels reached 20 psi. Backwashing mixes exhausted GAC grains throughout the bed depth, which decreases treatment efficiency by disrupting the mass transfer zone, causing early PCP breakthrough (Crittenden et al., 2012). Backwashing has historically been performed on both primary vessels in the same day and the vessels are immediately returned to service at the completion of backwashing (Tetra Tech 2015). Therefore, it is recommended that the backwashing procedure be changed so that only one of the primary vessels is backwashed on any single day. This change in procedure would likely produce an effluent that would have a relatively lower concentration than what would occur if both vessels were changed at once.



**Figure 9: Exceedances suspected to be related to backwashing of MPTP GAC vessels. The y-coordinates of the blue symbols have no significance; the blue symbols only show the dates of backwashing**

Pentachlorophenol concentrations from times when backwashing appeared to increase effluent PCP concentrations were utilized to test the potential effectiveness of backwashing one train at a time. For example, a hypothetical effluent PCP concentration was calculated for May 3, 2010, when the measured effluent concentration was 1.12 ppb. The previous week, the effluent PCP concentration was 0.2 ppb. Three assumptions were made in performing this calculation:

- 1) The train that is backwashed has the same effluent concentration that was measured after backwashing - 1.12 ppb;
- 2) The effluent concentration from the train that was not backwashed would have the same effluent concentration as was measured the previous week - 0.2 ppb; and
- 3) Each train treats one-half of the total influent flow.

Using these three assumptions, the effluent PCP concentration from both trains can be calculated with a mass balance. The blended effluent PCP concentration would be 0.66 ppb, which is less than the effluent standard of 1 ppb (equation 1).

$$(1.12+0.2)/2=0.66 \quad (1)$$

The exceedance on March 2, 2009 was suspected to have been caused by injection of a large amount of water into the south side injection gallery. This would have increased the groundwater elevation, which could have washed a large mass of PCP off of the vadose zone soil. Thus, the PCP concentration in the influent to the GAC vessels probably increased, overwhelming the treatment system. It is recommended that the amount of water sent to injection galleries be limited so that an excessive amount of water to be injected.

The introduction of retention pond water into the GAC vessels may have caused or contributed to the exceedances on April 7, 2003, June 13, 2011, and June 25, 2012 (Table I). . The retention pond captured leachate from the LTU. Each of these three exceedances were

preceded by multiple rainstorms in the previous weeks. The rainstorms may have created a large quantity of highly contaminated leachate that flowed to the retention pond, raising its water level to the point where the pond was excessively full so that pumping down the retention pond was necessary. The leachate probably contained high levels of PCP and other suspected contaminants (contaminant concentrations in the leachate were not measured) that could have quickly exhausted the adsorptive capacity of the GAC. The retention pond water has not been directly introduced in to the GAC vessels since being rerouted to infiltration galleries south of I-15/90 during 2014. Furthermore, the retention pond will be abandoned in the future during the decommissioning of the LTU. Thus, no recommendations on modifying the retention pond operation are given in this thesis.

Normal remediation activities at the MPTP were periodically shut down in order to perform maintenance or plant upgrades. These shutdowns were not observed in the groundwater elevation data due to the short duration of the shutdowns, with the longest being three hours (Appendix A). The standard operational protocol required groundwater elevations to be measured monthly, so any effect the pump shutdowns had on the water table elevation had come and gone before the next time the water table elevation was measured. Water was not pumped out of the trenches during these shutdowns which should have caused the water table to rise, potentially washing PCP out of a smear zone that likely occurs at the depth between the seasonal high and seasonal low water table. When pumping from the trenches was restarted, high concentrations of PCP were likely introduced into the system and apparently caused exceedances. By keeping these shutdowns to a minimum, it is proposed that exceedances of the effluent PCP limit could be reduced or prevented.

The exceedances caused by suspected exhaustion of the GAC in 2013 (Table I) could potentially have been exacerbated by precipitation events (Table II). These exceedances were grouped with normal plant operations because other periods of high precipitation did not cause exceedance issues, with the exception of the exceedance on September 8, 2014. The precipitation events added water to the site that would have possibly flushed downward through vadose zone soils, washing PCP and other contaminants off of the soil and transporting them to the groundwater. Infiltration quantities for the rainstorm on September 25, 2013 were estimated with the NRCS curve number method (Wanielista et al., 1997). In this method, the amount of infiltration equals precipitation minus runoff. Runoff occurs only when the precipitation exceeds 20 percent of the storage volume on and within the soil at saturation of the soil ( $S'$ ).  $S'$  is a function of the curve number (CN) for a particular soil:

$$S' = 1000/CN - 10 \quad (2)$$

An estimate of the curve number for soil at the MPTP was 61. Thus, the storage volume at saturation was 6.39 inches of water. Twenty percent of 6.39 inches is 1.27 inches. The precipitation on September 25, 2013 was 0.69 inches. Thus, all rainfall would have been stored on the site that day. Most of this would have infiltrated into the soil, mobilizing contaminants that would have flowed with the groundwater to the recovery trenches. Both the pumping rate and the influent PCP concentration were relatively high during this period (Table II), so the PCP load to the primary GAC vessels was high. If the primary GAC vessels were already near exhaustion, the increase in the PCP load to them may have caused GAC exhaustion to occur suddenly, leading to exceedances of the allowable effluent concentration. While exceedances stopped after the flow rate was reduced, the GAC was replaced shortly thereafter in November, 2013.

The exceedances caused by precipitation could potentially be reduced by lowering the pumping rate from the recovery trenches, which would raise the water table in order to store water in the soil. The lowered pumping rate will increase the time water spent in the GAC vessels, which should decrease the effluent PCP concentrations. Monitoring for a trend of elevated influent and BABB PCP concentrations would provide a guideline for pumping rate adjustments, until replacement carbon is installed. The BABB sample (averaged for both trains) on September 10, 2013 had a higher PCP concentration than the concentration had been the week before (Table II). A week later (September 16), the BABB concentration was much higher, showing that breakthrough had occurred in the primary columns. However, the pumping rate cannot be lowered to where the water table no longer slopes toward the recovery trenches, because it is essential that no groundwater leave the site. Groundwater elevations in the monitoring wells should be monitored frequently while the pumping rate is temporarily decreased to assure that groundwater continues to flow toward the recovery trenches.

A second recommendation to minimize storm water infiltration from potentially percolating downward through vadose zone soil is installing a soil cap over the south side of the site. With the upcoming abandonment of the LTU and cessation of remedial activities on the portion of the site south of I-15/90, a cap over this area could be installed that would not be in the way of future remediation activities. Such a cap would increase evapotranspiration so that infiltration would be decreased. Also, the cap should be sloped to enhance storm water runoff away from the areas of the greatest amount of soil contamination.

**Table II:** Precipitation events in fall of 2013 that potentially exacerbated carbon exhaustion.

<b>Date</b>	<b>Precipitation (in)</b>	<b>Flow Rate (gpm)</b>	<b>Influent PCP Concentration (ppb)</b>	<b>BABB PCP Concentrations (ppb)</b>
9/9/2013	0	335	62.7	1.47
9/10/2013	0	335		
9/11/2013	0	335		
9/12/2013	0	335		
9/13/2013	0.29	335		
9/14/2013	0	335		
9/15/2013	0	335		
9/16/2013	0.03	340	61.1	22.80
9/17/2013	0.45	340		
9/18/2013	0.12	340		
9/19/2013	0	340		
9/20/2013	0	340		
9/21/2013	0	340		
9/22/2013	0.1	340		
9/23/2013	0	340	89.1	31.10
9/24/2013	0.57	340		
9/25/2013	0.69	340		
9/26/2013	0.07	340		
9/27/2013	0	340		
9/28/2013	0	340		
9/29/2013	0.11	340		
9/30/2013	0.38	340	80.7	22.20
10/1/2013	0	325		
10/2/2013	0.03	325		
10/3/2013	0.03	325		
10/4/2013	0	325		
10/5/2013	0	325		
10/6/2013	0	325		
10/7/2013	0	325	83.8	30.00
10/8/2013	0	325		
10/9/2013	0	325		
10/10/2013	0	325		
10/11/2013	0	325		
10/12/2013	0	325		
10/13/2013	0	325		
10/14/2013	0.11	315	71.7	9.74

## 6.2. Plant Accidents

Three of the exceedances were caused through unpredictable accidents at the plant. Table III contains each exceedance and the corresponding causes determined from the evaluation. All accidents based exceedances are displayed in Figure 8 with date and concentration. These accidents (Table III) likely resulted in additional PCP entering the groundwater through flushing of the vadose zone, similar to the effects of shutting down the pumps during routine maintenance and infiltration from precipitation as discussed in Section 6.1.

**Table III:** Pentachlorophenol exceedances measured in the activated carbon effluent and potential accidental causes of treatment failures at the Montana Pole and Treating Plant, Butte, Montana 2003 to 2014.

Date	PCP (ppb)	Proposed cause for PCP effluent exceedance
9/20/2010	1.46	NHRT pump down during a power outage
1/13/2014	10.4	Potable water line break in vadose zone proximate to NHRT
1/20/2014	9.64	Potable water line break in vadose proximate NHRT

A power outage on September 20, 2010 shutdown the pump in the NHRT. This would have caused the groundwater to rise, potentially washing a likely smear zone between the seasonal high and low for the water table increasing the PCP concentration in the influent to the GAC system. A backup generator was considered as a recommendation to mitigate power failure but, due to the infrequency of power outages the cost of a generator that could run the recovery system did not outweigh the benefit it would provide.

Potable water line breaks in January 2014 (Table III) resulted in the flushing the likely smear zone at a depth between the seasonal high and low of the water table in the vicinity of the breaks. This increased PCP concentrations in the groundwater and, as with the other events where the vadose zone was flooded, apparently overwhelmed the capacity of the GAC treatment system. A flow meter to monitor for irregular flow rates in the potable water line was considered

but due to the rarity of this event, the cost of installing a control system specifically for it was not deemed cost effective. Additionally, future accidents should be repaired and contained quickly to return the site back to normal conditions.

### 6.3. Climatic Effects

The PCP effluent exceedance on September 8, 2014 was suspected to have been caused by an extreme precipitation event that resulted in surface water inflow onto the site (Table IV). This exceedance is labeled as a “climatic effect” in Figure 8. This exceedance was considered unique compared to the exceedances classified as due to normal plant operation with precipitation being a contributing factor (Table I), because it appears to have been solely caused by storm water run onto the site, and the effluent PCP concentration was in compliance the week after the exceedance without GAC replacement.

**Table IV:** Pentachlorophenol exceedance measured in the activated carbon effluent and potential climatic cause of treatment failure at the Montana Pole and Treating Plant, Butte, Montana 2003 to 2014

Date	PCP (ppb)	Proposed cause for PCP effluent exceedance
9/8/2014	5.41	Infiltration of surface water inflow from off site

Multiple rainstorms occurred between the 12 and 24 of August 2014 as observed at the Bert Mooney Airport weather station (Table V). During these rainstorms, runoff was observed to flow from the area south of West Greenwood Avenue onto the MPTP site (Figure 10). A business across West Greenwood Avenue from the MPTP site had covered a storm water catch basin with soil while doing landscaping work. Covering this catch basin may have caused the large storm water flow that crossed West Greenwood Avenue onto the MPTP site, because the water could not flow into the storm sewer underneath West Greenwood Avenue. The inflow of storm water runoff potentially increased infiltration on the south side of the MPTP site, which would have



flushed downwards through the vadose zone increasing the PCP concentration in groundwater. This may have caused the PCP exceedance on September 8, 2014. Though infiltration would have been relatively fast, there was potentially a lag time for the infiltrated water to reach the recovery trenches because groundwater moves slowly compared to flow on the surface. The business uncovered the catch basin in 2015, so storm water inflow to the MPTP site from the south is much less likely to occur in the future.

**Table V:** Precipitation events in August 2014 as recorded at the Bert Mooney Airport weather station.

<b>Date</b>	<b>Precipitation (in)</b>	<b>Influent concentration (ppb)</b>
8/11/2014	0	98.8
8/12/2014	0.26	
8/13/2014	0.59	
8/14/2014	0.01	
8/15/2014	0.36	
8/16/2014	0.06	
8/17/2014	0	
8/18/2014	0	107
8/19/2014	0.01	
8/20/2014	0.01	
8/21/2014	0.17	
8/22/2014	0.47	
8/23/2014	0.77	
8/24/2014	0.01	
8/25/2014	0	116
8/26/2014	0	
8/27/2014	0	
8/28/2014	0	
8/29/2014	0	
8/30/2014	0.12	
8/31/2014	0.02	
9/1/2014	0	
9/2/2014	0	124
9/3/2014	0	
9/4/2014	0	
9/5/2014	0	
9/6/2014	0	
9/7/2014	0	
9/8/2014	0	151



**Figure 10: Storm water runoff flowing south (left) to north (right) on to the MPTP site during a storm in 2014 (Photo by Tom Bowler, Tetra Tech Inc.).**

## 7. Future work

Implementing recommendations made in this document and subsequently monitoring their results would be a first step towards future work. Monitoring of effluent concentrations after changing to the suggested backwashing plan would provide information on the effectiveness of the change.

Groundwater at the site contains a variety of organic compounds in addition to the PCP and dioxins. A broad spectrum chemical analysis of contaminants potentially present, including petroleum hydrocarbons, could be added to the current PCP analysis. The resulting data would provide detailed information useful to plant operations in the future. Additional contaminants present in the groundwater could adsorb competitively with the PCP and reduce treatment efficiency.

It is not known how much an effect the shutdown of the recovery systems has on groundwater elevations. Groundwater elevations in the recovery trenches should be monitored during shutdowns to obtain data on whether the vadose zone is flooded due to rising groundwater.

Continued study of precipitation, water elevations in the recovery trenches, and effluent concentrations would be valuable to develop a correlation on how precipitation truly effects groundwater PCP concentrations and the elevation of the groundwater table. A study measuring precipitation, surface water inflow to the site and how such inflow affects groundwater levels would be beneficial in justifying future storm water controls.

## 8. Conclusion

Data collected from the MPTP provided a strong basis to perform analysis on the variables effecting effluent PCP concentrations. From the data, thirty exceedances of the treatment standard were recorded between 2000 and 2014. Eight of these exceedances were removed from the data as outliers due to the high groundwater PCP concentrations from 2000 to 2002. The remaining exceedances were separated into three groups based on their potential causes. Hypothesized causes were plant operational procedures, accidents, and climatic effects caused by precipitation. A simple operational recommendation to stagger the dates on which GAC vessel backwashing is performed was made to prevent or reduce the probability of similarly caused exceedances from occurring in the future. Another recommendation was to reduce the rate at which water is pumped from the recovery trenches after large precipitation events, because PCP concentrations in the groundwater increase after such precipitation events. Future work was proposed to evaluate the effectiveness of the proposed procedures after they have been implemented.

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## **Appendix A. Compiled MPTP Data**

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1-Jan-00	36	21.9	T	172																
2-Jan-00	28	5	0.01	172																
3-Jan-00	24.1	1	0	172	642.5	69.72	1.89	0.50	0.05	5429.30	5428.85	5428.82	5428.31	5428.24		5429.10	5428.71	5429.05	5428.96	
4-Jan-00	37.9	24.1	0	172																
5-Jan-00	30	21	0.03	172																
6-Jan-00	34	8.1	0	169																
7-Jan-00	35.1	21.9	0	169																
8-Jan-00	36	19.9	0	169																
9-Jan-00	35.1	19	0.14	169																
10-Jan-00	26.1	6.1	0.05	169																
11-Jan-00	28	18	0.13	169																
12-Jan-00	25	-2.9	0.01	169																
13-Jan-00	39	-9	T	169																
14-Jan-00	44.1	33.1	0	169																
15-Jan-00	39	26.1	T	169																
16-Jan-00	46.9	26.1	T	169																
17-Jan-00	37.9	6.1	0	169																
18-Jan-00	28.9	6.1	0	169	640.1	68.25			0.00											
19-Jan-00	37	9	0	169																
20-Jan-00	41	10	0	169																
21-Jan-00	37.9	14	T	169						5429.15	5428.83	5428.74	5428.24	5428.25		5429.13	5428.71	5429.07	5429.00	
22-Jan-00	36	17.1	T	169																
23-Jan-00	39	12.9	T	169																
24-Jan-00	37.9	12.9	0	169																
25-Jan-00	39.9	12	0.01	169																
26-Jan-00	37	15.1	0.02	169																
27-Jan-00	28	12	0.01	169																
28-Jan-00	26.1	-0.9	0	169																
29-Jan-00	26.1	-7.1	0	169																
30-Jan-00	28.9	-9	0	169																
31-Jan-00	32	-8	0	169	511.4	54.53	1.74	0.50	0.05											
1-Feb-00	45	1.9	0	169	</															



Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
22-Feb-00	51.1	27	0	172																
23-Feb-00	46	28	0	172																
24-Feb-00	37.9	27	0.15	172																
25-Feb-00	32	6.1	0.08	172																
26-Feb-00	39.9	6.1	0	172																
27-Feb-00	46.9	27	0	172																
28-Feb-00	45	30.9	0	172	750	81.39	449.00	0.20	0.02											
29-Feb-00										5429.24	5428.91	5428.89	5428.37	5428.35		5429.09	5428.71	5428.95	5428.90	
1-Mar-00	43	26.1	T	172																
2-Mar-00	51.1	19.9	0	172																
3-Mar-00	55	21.9	0	172																
4-Mar-00	55	23	0	172																
5-Mar-00	55	28	0	172																
6-Mar-00	51.1	28	T	182	702	80.61	447.50	45.80	5.26											
7-Mar-00	46.9	28	0.07	182																
8-Mar-00	34	21.9	0.14	182																
9-Mar-00	39.9	12	0	182																
10-Mar-00	42.1	17.1	0	182																
11-Mar-00	39.9	27	T	182																
12-Mar-00	39	19.9	0	182																
13-Mar-00	43	25	T	182	649	74.52	424.00	42.40	4.87	5429.14	5428.80	5428.71	5428.21	5428.18		5429.04	5428.76	5428.93	5428.86	
14-Mar-00	46.9	25	0	182																
15-Mar-00	43	21	0	161																
16-Mar-00	46	19	0.03	161																
17-Mar-00	37	24.1	T	161																
18-Mar-00	46.9	24.1	0	161																
19-Mar-00	39.9	21.9	0.13	161																
20-Mar-00	37.9	21	T	161	946	96.09	482.50	29.90	3.04											
21-Mar-00	53.1	12	0	161																
22-Mar-00	59	19	0	161						5429.45	5429.16	5429.07	5428.59	5428.59		5429.93	5429.97	5430.10	5430.05	
23-Mar-00	42.1	21	0.02	161	1069	108.58		71.60	7.27											
24-Mar-00	46.9	17.1	0	188						5430.16	5429.92	5429.85	5429.69	5429.68		5429.78	5431.31	5430.85	5431.36	
25-Mar-00	57.9	18	0	188																
26-Mar-00	57.9	26.1	0	188																
27-Mar-00	64	23	0	188	763	90.50	1.33	0.21	0.03											
28-Mar-00	48	25	0.23	188																
29-Mar-00	39.9	19	0.02	188																
30-Mar-00	46.9	28.9	0	190																
31-Mar-00	50	23	0	190						5428.98	5428.62	5428.57	5427.91	5427.86		5429.14	5428.77	5428.99	5428.91	
1-Apr-00	53.1	24.1	0.01	190																
2-Apr-00	44.1	23	0.03	190																
3-Apr-00	62.1	16	0	190																
4-Apr-00	69.1	30.9	T	190																
5-Apr-00	54	28	0	190																
6-Apr-00	46	27	0.01	190																
7-Apr-00	51.1	19.9	T	190																
8-Apr-00	64	19	0	190																
9-Apr-00	64	25	0	190																
10-Apr-00	59	25	0	190						5428.91	5428.57	5428.52	5427.87	5427.87		5428.84	5428.40	5428.71	5428.61	
11-Apr-00	66	21.9	0	195																
12-Apr-00	66.9	41	0	195																
13-Apr-00	54	33.1	0.19	195																

[illegible]



[illegible]

[illegible]

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	(°F)	(°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	
8-Nov-00	25	0	0.04	345																
9-Nov-00	23	7	0.05	345																
10-Nov-00	12.9	-15	T	345																
11-Nov-00	14	-8	0	345																
12-Nov-00	19.9	-9	0	345																
13-Nov-00	16	-13	0	345	770	167.60		0.20	0.04											
14-Nov-00	19	-8	0.01	345																
15-Nov-00	19.9	12	0.03	345						5428.82	5428.35	5428.22	5426.88	5426.89		5429.04	5428.61	5428.96	5428.68	5429.16
16-Nov-00	24.1	-2	T	345																
17-Nov-00	21	3	T	345																
18-Nov-00	36	1	0	345																
19-Nov-00	23	-7.1	0	345																
20-Nov-00	28	-7.1	0	345	838	182.40		0.10	0.02											
21-Nov-00	30	-0.9	0	345																
22-Nov-00	24.1	-4	0	345						5428.93	5428.47	5428.40	5427.15	5427.05		5429.04	5428.64	5428.93	5428.65	5429.07
23-Nov-00	26.1	-8	0	345																
24-Nov-00	36	8.1	T	345																
25-Nov-00	28.9	8.1	0	345																
26-Nov-00	37	10.9	T	345																
27-Nov-00	39	5	0.01	320	727	146.77		0.10	0.02											
28-Nov-00	28	-2.9	0	320																
29-Nov-00	28.9	-2	0.05	320																
30-Nov-00	34	19.9	T	320																
1-Dec-00	24.1	-0.9	0	235																
2-Dec-00	21.9	-4	0	235						5428.89	5428.46	5428.41	5427.50	5427.57		5428.83	5428.31	5428.71	5428.35	5428.79
3-Dec-00	39	3	0	235																
4-Dec-00	23	-5.1	0	186	640	75.10		0.20	0.02											
5-Dec-00	33.1	5	0	186																
6-Dec-00	27	1	0	186																
7-Dec-00	30	7	0	186																
8-Dec-00	21	-0.9	0	186																
9-Dec-00	34	9	T	186						5428.96	542									

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
30-Dec-00	28.9	5	0.01	186																
31-Dec-00	19.9	3.9	T	186																
1-Jan-01	33.1	1	T	186																
2-Jan-01	30	-5.1	0	186	591	69.35	1.33	0.20	0.02	5429.00	5428.57	5428.46	5427.89	5427.84		5428.72	5428.27	5428.65	5428.60	5428.66
3-Jan-01	36	10	0	186																
4-Jan-01	45	10.9	0	186																
5-Jan-01	48.9	14	0	186																
6-Jan-01	36	3.9	0	186																
7-Jan-01	23	-5.1	0	186																
8-Jan-01	26.1	-7.1	0	186	571	67.01	1.01	0.20	0.02											
9-Jan-01	32	6.1	T	186						5428.97										
10-Jan-01	34	8.1	0	186																
11-Jan-01	26.1	-0.9	0	186																
12-Jan-01	37	21.9	T	186																
13-Jan-01	27	6.1	T	186																
14-Jan-01	21.9	-0.9	0.02	186																
15-Jan-01	21	12	T	186																
16-Jan-01	16	-11	T	186	517	60.67	1.07	0.20	0.02											
17-Jan-01	19.9	-13	0	186						5428.95	5428.53	5428.48	5427.84	5427.78		5428.66	5428.09	5428.59	5428.52	5428.59
18-Jan-01	26.1	1.9	T	186																
19-Jan-01	28	7	0.13	186																
20-Jan-01	27	-6	T	186																
21-Jan-01	36	-6	0	186																
22-Jan-01	37	-0.9	0	186	554	65.01	0.29	0.10	0.01											
23-Jan-01	19	-5.1	T	186																
24-Jan-01	30.9	-5.1	0	186																
25-Jan-01	28	12	0.03	186																
26-Jan-01	26.1	-5.1	T	186																
27-Jan-01	16	-11	T	186						5428.99	5428.32	5428.39	5427.73	5427.67		5428.59	5428.07	5428.55	5428.49	5428.53
28-Jan-01	14	-18.9	T	186																
29-Jan-01	27	-15	0	186	550	64.54	0.53	0.20	0.02											
30-Jan-01	28	16	T	186																
31-Jan-01	30.9	18	T	186																
1-Feb-01	37	10.9	T	186																
2-Feb-01	39	21.9	T	186																
3-Feb-01	33.1	10.9	0	186																
4-Feb-01	41	1.9	0	186																
5-Feb-01	39	19	0.04	186	631	74.05	1.07	0.20	0.02											
6-Feb-01	21.9	3.9	0.01	186																
7-Feb-01	10.9	-16.1	T	186																
8-Feb-01	5	-25.1	T	186																
9-Feb-01	19	-17	0.01	186																
10-Feb-01	26.1	8.1	T	186																
11-Feb-01	25	-2.9	0.04	186																
12-Feb-01	28	-7.1	0	186	600	70.41	0.74	0.20	0.02	5428.89	5428.39	5428.33	5427.71	5427.72		5428.56	5427.99	5428.49	5428.46	5428.47
13-Feb-01	17.1	-13	0.01	186																
14-Feb-01	21	-20.9	0	186																
15-Feb-01	30.9	-5.1	T	186																
16-Feb-01	17.1	-0.9	T	186																
17-Feb-01	27	-0.9	0	186																
18-Feb-01	39.9	12	T	186																
19-Feb-01	37.9	6.1	0	186	581	68.18	0.53	0.20	0.02											

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NH RTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
13-Apr-01	39	10	T	190																
14-Apr-01	39	21.9	0	190						5429.14	5428.70	5428.67	5427.95	5427.92		5429.07	5428.95	5429.16	5429.03	5429.10
15-Apr-01	48.9	19	0	190																
16-Apr-01	54	27	0	193	491	59.79	2.84	0.29	0.04											
17-Apr-01	66	28.9	0	193																
18-Apr-01	61	26.1	0	193																
19-Apr-01	45	30	T	233																
20-Apr-01	35.1	30	0.51	233																
21-Apr-01	34	21	0.12	233						5428.74	5428.17	5428.13	5427.22	5427.18		5428.78	5428.61	5428.76	5428.71	5428.70
22-Apr-01	42.1	7	0	233																
23-Apr-01	51.1	30	0	245	365	56.42	3.73	0.45	0.07											
24-Apr-01	64	34	0	245																
25-Apr-01	70	28.9	0	245																
26-Apr-01	71.1	32	0	245																
27-Apr-01	68	37	0.06	245																
28-Apr-01	70	36	0.14	245																
29-Apr-01	53.1	32	T	245																
30-Apr-01	55.9	35.1	0.14	199	380	47.71	1.82	0.48	0.06											
1-May-01	41	26.1	0.01	199																
2-May-01	41	24.1	T	199																
3-May-01	54	19	0	199																
4-May-01	64	24.1	0	199																
5-May-01	57.9	30.9	T	199																
6-May-01	53.1	19.9	0	199																
7-May-01	66	19.9	0	197	487	60.53	1.84	1.12	0.14	5429.02	5428.55	5428.45	5427.82	5427.79		5428.66	5428.39	5428.55	5428.47	5428.54
8-May-01	72	28.9	0	197																
9-May-01	64.9	35.1	0	197																
10-May-01	61	28.9	0	197																
11-May-01	72	26.1	0	197																
12-May-01	82	32	T	197																
13-May-01	77	39	0.3																	

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
3-Jun-02	60.1	36	T	277	374	65.36	2.55	2.00	0.35											
4-Jun-02	64	33.1	0	277																
5-Jun-02	71.1	43	0	277																
6-Jun-02	70	46.9	0	277																
7-Jun-02	68	39.9	0.02	277																
8-Jun-02	50	32	0.57	277																
9-Jun-02	39	32	0.35	277																
10-Jun-02	45	32	0.1	277	283	49.46	9.04	0.80	0.14											
11-Jun-02	57.9	33.1	T	277																
12-Jun-02	63	33.1	0	277																
13-Jun-02	69.1	35.1	0	277																
14-Jun-02	77	39.9	T	277						5428.61	5428.04	5427.95	5426.88	5426.84	5426.99	5427.88	5427.52	5427.68	5427.55	5427.66
15-Jun-02	79	44.1	0	277																
16-Jun-02	82	42.1	0.01	277																
17-Jun-02	72	50	T	277	372	65.01	2.48	0.20	0.03											
18-Jun-02	66	39.9	0.1	277																
19-Jun-02	61	39	0	277																
20-Jun-02	73.9	33.1	0	277																
21-Jun-02	81	51.1	0.35	277																
22-Jun-02	70	46	0.07	277																
23-Jun-02	73.9	46.9	0.01	277																
24-Jun-02	80.1	42.1	0	277	301	52.60	1.98	0.36	0.06											
25-Jun-02	86	46	0	277																
26-Jun-02	89.1	48	0.02	277																
27-Jun-02	89.1	52	0.01	277																
28-Jun-02	81	48.9	0.06	277						5428.42	5427.87	5427.77	5426.65	5426.65	5426.79	5427.73	5427.37	5427.52	5427.37	5427.52
29-Jun-02	70	46.9	T	277																
30-Jun-02	81	39.9	0	277																
1-Jul-02	75	37.9	0	277	235	41.07	2.92	0.69	0.12											
2-Jul-02	81	36	0	277																
3-Jul-02	82.9	46.9	T	277																

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
15-Sep-02	84	42.1	0	277																
16-Sep-02	79	39.9	T	277	143	24.99	27.75	0.25	0.04											
17-Sep-02	54	44.1	0.3	277																
18-Sep-02	55.9	41	0.06	277																
19-Sep-02	71.1	35.1	0	277																
20-Sep-02	62.1	45	0	277																
21-Sep-02	55.9	27	0	277																
22-Sep-02	66.9	23	0	277																
23-Sep-02	69.1	28	0	277	189	33.03	25.15	0.84	0.15											
24-Sep-02	66.9	30.9	0	277																
25-Sep-02	60.1	32	0	277																
26-Sep-02	62.1	26.1	T	277						5428.37	5427.83	5427.75	5426.63	5426.62	5426.75	5427.58	5427.26	5427.38	5427.21	5427.41
27-Sep-02	48.9	39	0.24	277																
28-Sep-02	59	35.1	0	277																
29-Sep-02	63	28.9	0.04	277																
30-Sep-02	45	28	0.02	277	203	35.48	0.45	0.05	0.01											
1-Oct-02	39.9	21.9	0	277																
2-Oct-02	50	19.9	0	277																
3-Oct-02	44.1	26.1	0	277																
4-Oct-02	53.1	36	0.01	277																
5-Oct-02	50	34	0	277																
6-Oct-02	59	37.9	0	277																
7-Oct-02	63	30.9	0	277	183	31.98	4.32	0.74	0.13											
8-Oct-02	57	27	0	277																
9-Oct-02	62.1	26.1	0	277						5428.36	5427.81	5427.73	5426.60	5426.58	5426.70	5427.54	5427.26	5427.38	5427.02	5427.41
10-Oct-02	66	23	0	277																
11-Oct-02	39	23	T	277																
12-Oct-02	48.9	19	0	277																
13-Oct-02	63	16	0	277																
14-Oct-02	57	18	0	277	147	25.69	2.87	0.33	0.06											
15-Oct-02	59	19	0	277																

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NH RTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
11-Apr-03	64.9	28.9	0	225																
12-Apr-03	69.1	30	0	225																
13-Apr-03	61	35.1	T	225																
14-Apr-03	46.9	33.1	0.26	225	159	22.57	0.42	0.21	0.03											
15-Apr-03	39	28	0.01	225																
16-Apr-03	46.9	21.9	T	225																
17-Apr-03	46.9	25	0.11	225																
18-Apr-03	45	32	0.01	225																
19-Apr-03	53.1	26.1	T	225																
20-Apr-03	59	26.1	0	225																
21-Apr-03	63	27	0	225	144	20.44	0.34	0.15	0.02											
22-Apr-03	64.9	33.1	0.28	225																
23-Apr-03	46.9	41	0.61	225																
24-Apr-03	57.9	41	0.04	225																
25-Apr-03	48	32	0.25	225																
26-Apr-03	39.9	28.9	0.03	225						5429.25	5428.75	5428.71	5428.09	5428.03	5428.03	5427.85	5427.23	5427.37	5427.31	5427.52
27-Apr-03	46.9	25	0	225																
28-Apr-03	42.1	24.1	T	225	174	24.70	0.41	0.18	0.03											
29-Apr-03	41	30.9	0.22	225																
30-Apr-03	51.1	32	0.02	225																
1-May-03	46	33.1	0.11	225																
2-May-03	51.1	27	0.02	225																
3-May-03	48	30	0.07	225																
4-May-03	51.1	33.1	0.24	225																
5-May-03	43	30	0.02	225	157	22.29	0.58	0.23	0.03	5429.27	5428.79	5428.73	5428.10	5428.07	5428.10	5427.93	5427.31	5427.46	5427.33	5427.61
6-May-03	42.1	25	T	225																
7-May-03	48	21	0.04	225																
8-May-03	46	30	0	225																
9-May-03	45	34	T	225																
10-May-03	48	30	0	225																
11-May-03	52	26.1	0.19	225																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRT-PZ-01	NCRT-PZ-02	NCRT-PZ-03	NCRT-PZ-04	MW-F-01	MW-A-99	NHRT-PZ-04	MW-H-95	NHRT-MH-02	PZ-N5-03
	(°F)	(°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
2-Jun-03	61	41	0.06	225	130	18.45	0.21	0.13	0.02	5429.05	5428.58	5428.54	5427.91	5427.89	5427.91	5427.74	5427.09	5427.28	5427.09	5427.41
3-Jun-03	64.9	33.1	0	225																
4-Jun-03	62.1	39	0	225																
5-Jun-03	64	33.1	0	225																
6-Jun-03	59	36	T	225																
7-Jun-03	69.1	28	0	231																
8-Jun-03	77	34	T	231																
9-Jun-03	66	46	0.08	231	118	17.20	0.23	0.10	0.01											
10-Jun-03	72	46.9	0.29	231																
11-Jun-03	68	39.9	0	231																
12-Jun-03	75	35.1	0	231																
13-Jun-03	73	41	0.11	231																
14-Jun-03	75.9	39.9	T	231																
15-Jun-03	75.9	41	T	231																
16-Jun-03	79	42.1	0	231	123	17.93	0.29	0.10	0.01											
17-Jun-03	80.1	44.1	0	231																
18-Jun-03	87.1	51.1	T	231																
19-Jun-03	80.1	52	0.16	231						5428.78	5428.27	5428.23	5427.49	5427.47	5427.52	5427.66	5426.97	5427.23	5427.04	5427.32
20-Jun-03	64	46	0.08	231																
21-Jun-03	57	39.9	T	231																
22-Jun-03	48	34	0.14	231																
23-Jun-03	61	28	0.03	231	123	17.93	0.31	0.22	0.03											
24-Jun-03	54	37	0.02	231																
25-Jun-03	64	35.1	0.02	231																
26-Jun-03	72	37	0	231																
27-Jun-03	78.1	39.9	0	231																
28-Jun-03	77	42.1	0	231																
29-Jun-03	82	42.1	0.04	231																
30-Jun-03	87.1	50	0	231	74	10.78	0.24	0.11	0.02											
1-Jul-03	86	45	T	231																
2-Jul-03	79	42.1	T	231																
3-Jul-03	75.9	39	0	231																
4-Jul-03	79	39.9	0.01	231																
5-Jul-03	81	37	0	231																
6-Jul-03	77	41	0	231																
7-Jul-03	81	41	T	231	94	13.70	0.23	0.13	0.02											
8-Jul-03	70	46.9	0.07	231																
9-Jul-03	82.9	39	0	231						5428.67	5428.17	5428.13	5427.33	5427.32	5427.40	5427.59	5427.06	5427.22	5427.08	5427.32
10-Jul-03	88	39.9	0	231																
11-Jul-03	89.1	46.9	0	231																
12-Jul-03	91.9	48.9	0	231																
13-Jul-03	84.9	48.9	0	231																
14-Jul-03	82.9	43	0	231	94	13.70	0.27	0.14	0.02											
15-Jul-03	88	45	0	231																
16-Jul-03	91	50	0	231																
17-Jul-03	93.9	50	T	231																
18-Jul-03	93.9	51.1	0	231																
19-Jul-03	95	53.1	0	231																
20-Jul-03	95	54	0	231																
21-Jul-03	90	50	0	231	76	11.08	0.45	0.14	0.02											
22-Jul-03	95	48	0	231																
23-Jul-03	93.9	50	T	231						5428.61	5428.12	5428.06	5427.29	5427.25	5427.34	5427.61	5427.05	5427.18	5427.05	5427.24



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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
5-Nov-03	19	-18.9	0	235						5428.57	5428.12	5428.03	5427.21	5427.18	5427.26	5427.66	5427.27	5427.36	5427.25	5427.43
6-Nov-03	27	-14.1	0	235																
7-Nov-03	30.9	-9.9	0	235																
8-Nov-03	37.9	-4	0	235																
9-Nov-03	43	7	0	235																
10-Nov-03	41	34	T	235	56	8.30	0.22	0.09	0.01											
11-Nov-03	37.9	28	0.01	235																
12-Nov-03	37.9	15.1	T	235																
13-Nov-03	37.9	7	0	235																
14-Nov-03	42.1	8.1	0	235																
15-Nov-03	41	10	T	235																
16-Nov-03	43	19.9	T	235																
17-Nov-03	39.9	28	0	235	57	8.45	0.19	0.09	0.01											
18-Nov-03	48	28.9	0	235																
19-Nov-03	55	30	0.02	235																
20-Nov-03	30	8.1	0.01	235						5428.57	5428.07	5428.06	5427.21	5427.17	5427.24	5427.62	5427.21	5427.33	5427.23	5427.42
21-Nov-03	19.9	-6	0.09	235																
22-Nov-03	15.1	-9	T	235																
23-Nov-03	27	1	T	235																
24-Nov-03	30	10.9	T	235	61	9.04	0.16	0.07	0.01											
25-Nov-03	28.9	15.1	0	235																
26-Nov-03	28.9	3	0.03	235																
27-Nov-03	30.9	0	0	235																
28-Nov-03	45	10	0	235																
29-Nov-03	44.1	28	0	235																
30-Nov-03	41	21.9	0	235																
1-Dec-03	45	25	0.02	235	66	9.79	0.20	0.10	0.01											
2-Dec-03	43	26.1	T	235																
3-Dec-03	44.1	23	T	235																
4-Dec-03	28.9	8.1	0	235						5428.56	5428.07	5428.01	5427.16	5427.13	5427.21	5427.60	5427.21	5427.28	5427.25	5427.38
5-Dec-03	43	19.9																		

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	(°F)	(°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
27-Dec-03	19.9	-7.1	T	235																
28-Dec-03	21.9	-11	T	235																
29-Dec-03	21.9	10	0.04	235	68	10.08	0.20	0.08	0.01											
30-Dec-03	14	-17	0.01	235																
31-Dec-03	23	3	T	235																
1-Jan-04	32	5	0.01	235																
2-Jan-04	28.9	1.9	T	235																
3-Jan-04	21.9	-11	0	235																
4-Jan-04	17.1	-27	T	235																
5-Jan-04	-9.9	-36	0	235	63	9.34	0.26	0.08	0.01											
6-Jan-04	9	-32.1	T	235																
7-Jan-04	28.9	-2.9	0	235																
8-Jan-04	35.1	5	0	235																
9-Jan-04	34	7	0	235						5428.51	5428.03	5427.96	5427.12	5427.10	5427.14	5427.57	5427.16	5427.32	5427.24	5427.37
10-Jan-04	42.1	6.1	0	235																
11-Jan-04	35.1	3.9	0	235																
12-Jan-04	28.9	0	0	235	55	8.15	0.21	0.10	0.01											
13-Jan-04	44.1	7	0	235																
14-Jan-04	34	5	0	235																
15-Jan-04	33.1	-0.9	0	235																
16-Jan-04	37	7	0	235																
17-Jan-04	26.1	1	0	235																
18-Jan-04	27	-2.9	0	235																
19-Jan-04	33.1	12.9	T	235	56	8.30	0.19	0.09	0.01											
20-Jan-04	32	3.9	T	235																
21-Jan-04	30	-0.9	0	235																
22-Jan-04	35.1	1.9	0	235						5428.52	5428.04	5427.97	5427.14	5427.09	5427.09	5427.50	5426.96	5427.23	5427.06	5427.33
23-Jan-04	37	24.1	0.05	235																
24-Jan-04	34	24.1	0.08	235																
25-Jan-04	24.1	5	T	235																
26-Jan-04	27	3.9	0	235	65	9.64	0.22	0.08	0.01											
27-Jan-04	35.1	21	0	235																



Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
10-Apr-04	48	21	0	245																
11-Apr-04	59	21.9	0	245																
12-Apr-04	66.9	26.1	0	245	74	11.44	0.14	0.08	0.01											
13-Apr-04	69.1	28.9	T	245																
14-Apr-04	55.9	34	0.01	245																
15-Apr-04	52	28	0	245																
16-Apr-04	53.1	19	T	245																
17-Apr-04	46	33.1	0.28	245																
18-Apr-04	46	30.9	0.03	245																
19-Apr-04	48	28	0.12	245	74	11.44	0.17	0.07	0.01	5428.59	5428.02	5428.01	5427.12	5427.07	5427.12	5427.47	5427.18	5427.22	5427.14	5427.28
20-Apr-04	46	28.9	0.05	245																
21-Apr-04	46	21.9	T	245																
22-Apr-04	55.9	26.1	0	245																
23-Apr-04	64.9	24.1	0	245																
24-Apr-04	53.1	34	0	245																
25-Apr-04	61	24.1	0	245																
26-Apr-04	71.1	28	0	241	62	9.43	0.18	0.07	0.01											
27-Apr-04	71.1	30	T	241																
28-Apr-04	46	25	0.26	241																
29-Apr-04	51.1	16	0	241																
30-Apr-04	57	24.1	0	241						5428.62	5428.07	5428.04	5427.24	5427.19	5427.24	5427.37	5426.88	5427.06	5426.95	5427.13
1-May-04	68	28	0	241																
2-May-04	70	32	0	241																
3-May-04	70	37	0	241	73	11.10	0.84	0.11	0.02											
4-May-04	75	35.1	0	241																
5-May-04	73.9	39.9	0	241																
6-May-04	70	34	0	241																
7-May-04	73.9	41	0	241																
8-May-04	71.1	37	0	241																
9-May-04	60.1	30.9	0	241																
10-May-04	55.9	34	T	241	33	5.02	0.34	0.08	0.01											



Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NH RTMH-02	PZ-N5-03
	(°F)	(°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
23-Jul-04	73.9	45	T	244																
24-Jul-04	80.1	48	0	244																
25-Jul-04	82.9	45	T	244																
26-Jul-04	82	45	0	260	72	11.81	0.18	0.09	0.02											
27-Jul-04	73.9	39	0	260																
28-Jul-04	77	35.1	0	260																
29-Jul-04	81	42.1	0	260																
30-Jul-04	82.9	43	0	260																
31-Jul-04	86	43	0	260																
1-Aug-04	89.1	46	T	260																
2-Aug-04	78.1	51.1	0.04	260	58	9.51	0.19	0.10	0.02	5428.62	5428.11	5428.03	5427.25	5427.24	5427.26	5427.30	5426.76	5426.89	5426.80	5426.99
3-Aug-04	75.9	48.9	0.11	260																
4-Aug-04	82	45	0.01	260																
5-Aug-04	84	51.1	0.01	260																
6-Aug-04	84.9	43	0	260																
7-Aug-04	70	45	0	260																
8-Aug-04	75.9	34	0	260																
9-Aug-04	81	41	0	260	77	12.63	0.26	0.16	0.03											
10-Aug-04	80.1	41	0	260																
11-Aug-04	79	39.9	0	260																
12-Aug-04	84	39	0	260																
13-Aug-04	86	39.9	0	260																
14-Aug-04	87.1	43	0	260																
15-Aug-04	86	46	0	260																
16-Aug-04	81	57.9	0.4	260	72	11.81	0.15	0.08	0.01											
17-Aug-04	75	55	0.01	260																
18-Aug-04	64	50	0.2	260						5428.55	5428.03	5427.98	5427.18	5427.17	5427.19	5427.11	5426.51	5426.68	5426.62	5426.81
19-Aug-04	73.9	46	0.06	260																
20-Aug-04	75.9	48	0	260																
21-Aug-04	78.1	46	T	260																
22-Aug-04	73	46.9	0.2	260																
23-Aug-04	60.1	44.1	0.75	260																



BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRT-PZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	(°F)	Temp (°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
13-Sep-04	55.9	39.9	0.09	260	79	12.96	0.84	0.39	0.06											
14-Sep-04	53.1	37.9	0.02	260																
15-Sep-04	57.9	35.1	T	260																
16-Sep-04	62.1	39	T	260																
17-Sep-04	66.9	33.1	T	260																
18-Sep-04	53.1	34	0.37	260																
19-Sep-04	41	35.1	0.25	260																
20-Sep-04	46	33.1	0.09	260	69	11.32	0.27	0.14	0.02											
21-Sep-04	45	26.1	T	260						5428.86	5428.33	5428.26	5427.49	5427.47	5427.48	5427.36	5426.81	5426.93	5426.88	5427.07
22-Sep-04	52	39	0.02	260																
23-Sep-04	61	41	0.02	260																
24-Sep-04	66.9	32	0	260																
25-Sep-04	73.9	33.1	0	260																
26-Sep-04	70	35.1	0	260																
27-Sep-04	66.9	34	0	260	62	10.17	0.20	0.06	0.01											
28-Sep-04	72	33.1	0	260																
29-Sep-04	69.1	30.9	0	260																
30-Sep-04	64.9	32	0	260																
1-Oct-04	60.1	34	0	260																
2-Oct-04	66.9	28	0	260																
3-Oct-04	68	28.9	0	260																
4-Oct-04	69.1	28.9	0	260	66	10.83	0.20	0.11	0.02											
5-Oct-04	68	27	0	260																
6-Oct-04	69.1	26.1	0	260						5428.80	5428.28	5428.17	5427.48	5427.46	5427.47	5427.43	5426.88	5427.02	5426.94	5427.13
7-Oct-04	61	34	0.02	260																
8-Oct-04	72	27	0	260																
9-Oct-04	72	39.9	0	260																
10-Oct-04	52	27	0	260																
11-Oct-04	59	21	0	260	74	12.14	0.20	0.09	0.02											
12-Oct-04	55.9	30	T	260																
13-Oct-04	61	23	0	260																
14-Oct-04	68	30	0	260																
15-Oct-04	54	39.9	T	260																
16-Oct-04	57	37.9	0	260																
17-Oct-04	46.9	34	0.02	260																
18-Oct-04	44.1	30	0.14	260	68	11.15	0.24	0.13	0.02											
19-Oct-04	48	21	0	260																
20-Oct-04	48.9	34	0.04	260																
21-Oct-04	48	28	0.07	260																
22-Oct-04	46	24.1	0	260																
23-Oct-04	41	28.9	0.01	260																
24-Oct-04	39.9	21	0	260																
25-Oct-04	42.1	14	0	260	66	10.83	0.21	0.10	0.02											
26-Oct-04	50	24.1	0	260																
27-Oct-04	53.1	26.1	0	260																
28-Oct-04	44.1	26.1	0	260																
29-Oct-04	39.9	34	0	260																
30-Oct-04	45	25	0.03	260																
31-Oct-04	34	16	T	260																
1-Nov-04	37.9	9	0	260																
2-Nov-04	53.1	30.9	0	260																
3-Nov-04	37	19	0.03	260	48	7.87	0.13	0.07	0.01	5428.79	5428.29	5428.19	5427.47	5427.45	5427.45	5427.44	5426.90	5427.04	5426.97	5427.16

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	(°F)	(°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
4-Nov-04	44.1	9	0	260																
5-Nov-04	59	16	0	260																
6-Nov-04	57.9	30	0	260																
7-Nov-04	62.1	26.1	0	260																
8-Nov-04	64	21	0	260	54	8.86	0.14	0.10	0.02											
9-Nov-04	57	28	0	260																
10-Nov-04	41	25	0	260																
11-Nov-04	50	19	0	260																
12-Nov-04	48	15.1	0	260																
13-Nov-04	48.9	12.9	0	260																
14-Nov-04	48.9	12	0	260																
15-Nov-04	50	15.1	0	260	61	10.01	0.18	0.10	0.02											
16-Nov-04	46.9	25	0	260																
17-Nov-04	46.9	18	0	260																
18-Nov-04	48.9	12	T	260																
19-Nov-04	33.1	19	0.01	260																
20-Nov-04	26.1	3	T	260																
21-Nov-04	32	0	0	260																
22-Nov-04	35.1	12	T	260			0.17	0.12	0.02											
23-Nov-04	36	24.1	T	260																
24-Nov-04	44.1	26.1	0	260																
25-Nov-04	43	30	T	260																
26-Nov-04	33.1	9	0.01	260																
27-Nov-04	24.1	6.1	T	260																
28-Nov-04	25	3	0	260																
29-Nov-04	26.1	1	0	260	58	9.51	0.19	0.09	0.01											
30-Nov-04	30	3.9	T	260																
1-Dec-04	28.9	16	0	260																
2-Dec-04	34	19	0	260																
3-Dec-04	39.9	21	0	260																
4-Dec-04	37.9	12	0	260																
5-Dec-04	37.9	5	0	260																
6-Dec-04	35.1	14	T	260	56	9.19	0.13	0.09	0.01											
7-Dec-04	39.9	21																		







BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole







Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
3-Nov-05	37.9	25	0.08	280																
4-Nov-05	37	24.1	0	280																
5-Nov-05	36	25	T	280																
6-Nov-05	41	26.1	0.03	280																
7-Nov-05	39	28.9	0.07	280	58.7	10.37	0.22	0.10	0.02											
8-Nov-05	32	9	0.19	280																
9-Nov-05	37.9	1.9	0	280																
10-Nov-05	52	10	0	280																
11-Nov-05	48.9	21.9	T	280																
12-Nov-05	34	19.9	0.07	280																
13-Nov-05	37.9	12	0	280																
14-Nov-05	37.9	17.1	T	280	41.8	7.38	<0.1	0.08	0.01											
15-Nov-05	27	1	T	280																
16-Nov-05	36	26.1	T	280																
17-Nov-05	39.9	16	0.01	280																
18-Nov-05	43	12.9	0	280																
19-Nov-05	45	17.1	0	280																
20-Nov-05	46.9	16	0	280																
21-Nov-05	46	16	0	280	50.2	8.87	0.25	0.10	0.02											
22-Nov-05	46	16	0	280																
23-Nov-05	46.9	14	0	280																
24-Nov-05	44.1	12.9	0	280																
25-Nov-05	42.1	12	0.13	280																
26-Nov-05	33.1	21	0.07	280																
27-Nov-05	24.1	18	T	280																
28-Nov-05	19	-6	T	280	51.9	9.17	0.20	0.10	0.02											
29-Nov-05	25	-6	0.02	280																
30-Nov-05	26.1	5	T	280																
1-Dec-05	23	1.9	T	280																
2-Dec-05	28	9	0.17	280																
3-Dec-05	24.1	1	T	280																
4-Dec-05	19	-6	T	280																
5-Dec-05	25	6.1	0.03	280	73.5	12.98	0.28	0.10	0.02	5428.50	5427.93	5427.83	5426.96	5426.94	5427.00	5427.20	5426.67	5426.87	5426.72	5426.93
6-Dec-05	6.1	-24	T	280																
7-Dec-05	-2	-27.9	0	280																
8-Dec-05	10	-20.9	T	280																
9-Dec-05	24.1	-8	0	280																
10-Dec-05	21	-2.9	0	280																
11-Dec-05	27	1	0	280																
12-Dec-05	26.1	-2.9	0	280	34.3	6.06	0.22	0.11	0.02											
13-Dec-05	27	3	T	280																
14-Dec-05	25	-6	T	280																
15-Dec-05	15.1	-9.9	T	280																
16-Dec-05	14	7	0.03	280																
17-Dec-05	8.1	-15	0	280																
18-Dec-05	1.9	-23.1	0	280																
19-Dec-05	23	-20	0	315	31	6.16	0.67	0.22	0.04											
20-Dec-05	36	19	0	315																
21-Dec-05	44.1	26.1	0.01	315																
22-Dec-05	46.9	34	0.05	315																
23-Dec-05	39.9	26.1	0.14	315																
24-Dec-05	50	25	0	315																

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
25-Dec-05	43	21	0	315																
26-Dec-05	41	28	0.01	315																
27-Dec-05	39	24.1	0	315	25.7	5.11	0.21	0.14	0.03											
28-Dec-05	37.9	30	0.31	315																
29-Dec-05	35.1	12.9	T	315																
30-Dec-05	34	12	T	315																
31-Dec-05	41	27	T	315																
1-Jan-06	37.9	28.9	0.02	315																
2-Jan-06	37.9	26.1	0	315																
3-Jan-06	36	19	T	315	59	11.73	0.34	0.14	0.03											
4-Jan-06	35.1	12	0	315																
5-Jan-06	41	10.9	0	315																
6-Jan-06	35.1	12.9	0	315																
7-Jan-06	43	15.1	0	315																
8-Jan-06	32	12	T	315																
9-Jan-06	34	5	0	315	55.7	11.07	0.32	0.16	0.03	5428.20	5427.57	5427.45	5426.46	5426.45	5426.54	5426.89	5426.41	5426.57	5426.47	5426.68
10-Jan-06	42.1	26.1	0.01	315																
11-Jan-06	37.9	21.9	0.32	315																
12-Jan-06	32	10	0	315																
13-Jan-06	42.1	10	0	315																
14-Jan-06	45	17.1	0	315																
15-Jan-06	36	12.9	T	315																
16-Jan-06	28	10.9	0.02	315																
17-Jan-06	39.9	28	0	315	47.9	9.52	0.18	0.12	0.02											
18-Jan-06	35.1	12	0.01	315																
19-Jan-06	28	10	T	315																
20-Jan-06	30.9	10	0	315																
21-Jan-06	30	7	0.02	315																
22-Jan-06	28.9	1.9	0	315																
23-Jan-06	43	24.1	0	315	40	7.95	0.22	0.14	0.03											
24-Jan-06	34	10.9	0	315																
25-Jan-06	46.9	3.9	0	315																
26-Jan-06	37	5	0	315																
27-Jan-06	33.1	10.9	T	315																
28-Jan-06	30	10	T	315																
29-Jan-06	30.9	19.9	0.01	315																
30-Jan-06	43	25	T	315	56.5	11.23	0.30	0.15	0.03											
31-Jan-06	30.9	21	0.04	315																
1-Feb-06	37	25	T	315																
2-Feb-06	37	19.9	0	315																
3-Feb-06	37.9	18	T	315																
4-Feb-06	39.9	19	0.05	315																
5-Feb-06	30.9	9	0	315																
6-Feb-06	28	1.9	0	315	40.7	8.09	0.15	0.09	0.02	5428.15	5427.46	5427.33	5426.36	5426.32	5426.48	5426.81	5426.16	5426.48	5426.32	5426.53
7-Feb-06	33.1	1.9	0	315																
8-Feb-06	46.9	9	0	315																
9-Feb-06	35.1	10.9	0	315																
10-Feb-06	21.9	-2	0	315																
11-Feb-06	27	-7.1	0	315																
12-Feb-06	33.1	-0.9	0	315																
13-Feb-06	41	3.9	T	315	35.9	7.13	0.13	0.08	0.02											
14-Feb-06	28	3	T	315																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
15-Feb-06	18	-4	T	315																
16-Feb-06	7	-11.9	T	315																
17-Feb-06	-2	-22	T	315																
18-Feb-06	5	-29	0	315																
19-Feb-06	14	-22	0	315																
20-Feb-06	27	-11.9	0	315																
21-Feb-06	28.9	17.1	0	315	40.9	8.13	0.32		0.00											
22-Feb-06	34	23	T	315																
23-Feb-06	39.9	28.9	0	315																
24-Feb-06	34	1.9	0.04	315																
25-Feb-06	36	-2.9	0	315																
26-Feb-06	51.1	12	0	315																
27-Feb-06	48	30	0	315	33.8	6.72	0.06	0.14	0.03											
28-Feb-06	48	32	0.06	315																
1-Mar-06	41	21.9	0	315																
2-Mar-06	44.1	14	0	315																
3-Mar-06	46.9	23	0	315																
4-Mar-06	36	24.1	T	315																
5-Mar-06	41	15.1	0	315																
6-Mar-06	48	24.1	T	315	35.9	7.13	0.11	0.06	0.01	5428.40	5427.76	5427.70	5426.67	5426.66	5426.78	5427.06	5426.51	5426.70	5426.54	5426.75
7-Mar-06	37.9	25	0.06	315																
8-Mar-06	37	18	0	315																
9-Mar-06	32	19	0.01	315																
10-Mar-06	30	5	0	315																
11-Mar-06	30.9	5	0	315																
12-Mar-06	28.9	12.9	T	315																
13-Mar-06	34	9	0	315	34.4	6.84	0.25	0.07	0.01											
14-Mar-06	36	12.9	T	315																
15-Mar-06	35.1	19.9	0.01	315																
16-Mar-06	42.1	12.9	0	315																
17-Mar-06	45	19	0	315																
18-Mar-06	37	27	T	315																
19-Mar-06	28.9	19.9	T	315																
20-Mar-06	33.1	19.9	T	315	32	6.36	0.11	0.06	0.01											
21-Mar-06	37.9	18	T	315																
22-Mar-06	43	23	0	315																
23-Mar-06	50	21.9	0	315																
24-Mar-06	54	24.1	0	315																
25-Mar-06	57	32	0.13	315																
26-Mar-06	39	21.9	0.07	315																
27-Mar-06	46.9	17.1	0	315	48.9	9.72	0.19	0.07	0.01											
28-Mar-06	55.9	21.9	0	315																
29-Mar-06	46	33.1	0.23	315																
30-Mar-06	48.9	30.9	0.01	315																
31-Mar-06	48.9	30	0	315																
1-Apr-06	50	30	0.58	315																
2-Apr-06	41	12.9	T	315																
3-Apr-06	48.9	26.1	T	315	47.1	9.36	0.24	0.09	0.02	5428.18	5427.56	5427.45	5426.37	5426.44	5426.43	5426.78	5426.31	5426.57	5426.37	5426.69
4-Apr-06	54	35.1	0.03	315																
5-Apr-06	53.1	33.1	1.09	315																
6-Apr-06	37.9	33.1	0.44	315																
7-Apr-06	51.1	30.9	0	315																

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
8-Apr-06	54	28.9	0.03	315																
9-Apr-06	52	37	0	315																
10-Apr-06	48.9	30.9	0.09	315	55.6	11.05	0.41	0.13	0.03											
11-Apr-06	52	28	0	315																
12-Apr-06	60.1	25	0	315																
13-Apr-06	53.1	37.9	0.01	315																
14-Apr-06	59	35.1	0.01	315																
15-Apr-06	60.1	36	0.02	315																
16-Apr-06	43	30.9	0.44	315																
17-Apr-06	37	28	0.01	315	55.4	11.01	1.77	0.36	0.07											
18-Apr-06	41	25	T	315																
19-Apr-06	53.1	18	0	315																
20-Apr-06	64.9	23	0	315																
21-Apr-06	68	28.9	0	315																
22-Apr-06	63	32	0.06	315																
23-Apr-06	37	28	0.04	315																
24-Apr-06	39	27	0.01	315	81.9	16.28	0.73	0.20	0.04											
25-Apr-06	53.1	30	T	315																
26-Apr-06	59	26.1	0	315																
27-Apr-06	57	33.1	T	315																
28-Apr-06	63	26.1	0	315																
29-Apr-06	72	30	0	315						5428.82	5428.21	5428.14	5427.20	5427.21	5427.33	5427.80	5427.30	5427.52	5427.33	5427.52
30-Apr-06	55	35.1	0.27	315																
1-May-06	61	25	0	315																
2-May-06	48	27	0	315	83.6	16.61	0.94	3.35	0.67											
3-May-06	45	21.9	0	315																
4-May-06	53.1	19	0	315																
5-May-06	66	21.9	0	315																
6-May-06	64.9	28	0	315																
7-May-06	53.1	37	T	315																
8-May-06	50	30.9	T	315																
9-May-06	51.1	27	T	330	72.4	15.07	0.62	0.12	0.02											
10-May-06	57.9	21.9	0	330																
11-May-06	66.9	28.9	0	330																
12-May-06	66.9	32	0	330																
13-May-06	71.1	28	0	330																
14-May-06	75.9	32	0	330																
15-May-06	80.1	41	0	330	66.3	13.80	0.52	0.25	0.05											
16-May-06	82.9	39	0	330																
17-May-06	82	41	T	330																
18-May-06	82	39.9	T	330																
19-May-06	75.9	54	T	330																
20-May-06	72	46	0.28	330																
21-May-06	78.1	39	0	330																
22-May-06	75	45	T	330	75.6	15.74	0.43	0.60	0.12											
23-May-06	66.9	42.1	T	330																
24-May-06	72	34	0	330																
25-May-06	72	41	T	330																
26-May-06	51.1	43	0.35	330																
27-May-06	44.1	37	0.39	330																
28-May-06	46.9	34	0.25	330																
29-May-06	55	36	0.01	330																

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
30-May-06	62.1	30	0	330		75.5	15.72	1.20	0.34	0.07										
31-May-06	70	33.1	0	330																
1-Jun-06	79	41	0	330																
2-Jun-06	82	45	0.03	330																
3-Jun-06	66.9	51.1	0.05	330																
4-Jun-06	73.9	45	0.14	330																
5-Jun-06	75.9	39	0	330	67.3	14.01	0.18	0.08	0.02	5428.42	5427.77	5427.68	5426.62	5426.61	5426.76	5427.41	5426.90	5427.15	5426.91	5427.12
6-Jun-06	80.1	43	T	330																
7-Jun-06	79	55	0.43	330																
8-Jun-06	69.1	48.9	0.13	330																
9-Jun-06	60.1	45	0.58	330																
10-Jun-06	57.9	45	0.71	330																
11-Jun-06	64	44.1	0.08	330																
12-Jun-06	75.9	46	0.01	330																
13-Jun-06	82.9	55	T	330	69.7	14.51	7.72	1.29	0.27											
14-Jun-06	64	46	0.29	330																
15-Jun-06	62.1	41	0	330																
16-Jun-06	70	41	T	330																
17-Jun-06	68	45	T	330																
18-Jun-06	73	34	0	330																
19-Jun-06	64.9	45	0.08	330	60.8	12.66	0.41	0.29	0.06											
20-Jun-06	66.9	37.9	0	330																
21-Jun-06	69.1	36	0	330																
22-Jun-06	77	41	0	330																
23-Jun-06	75.9	39	0	330																
24-Jun-06	77	39.9	0	330																
25-Jun-06	81	52	0	330																
26-Jun-06	81	46	0	330	63.4	13.20	9.83	0.40	0.08											
27-Jun-06	84	51.1	T	330																
28-Jun-06	87.1	44.1	T	330																
29-Jun-06	84	51.1	0.29	330																
30-Jun-06	78.1	46.9	0	330																
1-Jul-06	81	48	0	330																
2-Jul-06	84	50	T	330																
3-Jul-06	78.1	57	T	330																
4-Jul-06	82.9	46.9	T	330																
5-Jul-06	80.1	55.9	0.22	330	64.7	13.47	5.93	0.10	0.02											
6-Jul-06	78.1	53.1	0.22	330																
7-Jul-06	78.1	52	0.14	330																
8-Jul-06	84	45	0	330																
9-Jul-06	86	48	T	330																
10-Jul-06	84.9	45	T	330	78	16.24	2.42	0.61	0.13	5428.59	5427.96	5427.87	5426.85	5426.85	5427.00	5427.71	5427.25	5427.45	5427.22	5427.41
11-Jul-06	88	46.9	0.01	330																
12-Jul-06	78.1	50	0.13	330																
13-Jul-06	81	43	0	330																
14-Jul-06	89.1	44.1	0	330																
15-Jul-06	93	50	0	330																
16-Jul-06	89.1	50	T	330																
17-Jul-06	90	50	0	330	4.21	0.88	1.07	0.82	0.17											
18-Jul-06	89.1	48.9	0	330																
19-Jul-06	89.1	44.1	0	330																
20-Jul-06	88	48.9	0	330																

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
21-Jul-06	88	48	0	330																
22-Jul-06	96.1	51.1	0	330																
23-Jul-06	91.9	55	T	330																
24-Jul-06	89.1	60.1	0	330	8.81	1.83	0.55	0.32	0.07											
25-Jul-06	89.1	51.1	0	330																
26-Jul-06	88	51.1	0	330																
27-Jul-06	91.9	46	0	330																
28-Jul-06	93.9	50	0	330																
29-Jul-06	93.9	51.1	0	330																
30-Jul-06	84	48.9	0	330																
31-Jul-06	75.9	41	0	330	98.8	20.57	2.25	0.39	0.08											
1-Aug-06	75	50	0	330																
2-Aug-06	77	45	0	330																
3-Aug-06	82	39	0	330																
4-Aug-06	84.9	42.1	T	330																
5-Aug-06	82.9	44.1	0	330																
6-Aug-06	86	43	0	330																
7-Aug-06	87.1	46	0.02	330	61.5	12.80	8.63	0.36	0.07											
8-Aug-06	88	45	0.01	330																
9-Aug-06	77	45	0	330																
10-Aug-06	86	43	T	330																
11-Aug-06	79	46	0	330																
12-Aug-06	69.1	43	T	330																
13-Aug-06	75	35.1	0	330																
14-Aug-06	82.9	37.9	0	330						5428.31	5427.71	5427.62	5426.58	5426.56	5426.70	5427.40	5426.98	5427.16	5426.92	5427.10
15-Aug-06	80.1	41	T	330	78.1	16.26	0.13	0.09	0.02											
16-Aug-06	73.9	45	0.04	330																
17-Aug-06	64.9	44.1	0.01	330																
18-Aug-06	75	36	0	330																
19-Aug-06	84	37	0	330																
20-Aug-06	84	37.9	0	330																
21-Aug-06	87.1	45	0	330	71.4	14.87	0.54	0.41	0.09											
22-Aug-06	87.1	51.1	0	330																
23-Aug-06	84.9	43	0	330																
24-Aug-06	75	42.1	T	330																
25-Aug-06	64.9	51.1	0.01	330																
26-Aug-06	75.9	42.1	0	330																
27-Aug-06	80.1	41	0	330																
28-Aug-06	84.9	42.1	T	330	66.6	13.87	0.54	0.22	0.05											
29-Aug-06	86	45	T	330																
30-Aug-06	66.9	37	T	330																
31-Aug-06	63	27	0	330																
1-Sep-06	69.1	26.1	0	330																
2-Sep-06	79	33.1	0	330																
3-Sep-06	84.9	35.1	0	330																
4-Sep-06	87.1	39.9	0	330																
5-Sep-06	84.9	41	0	330	32.8	6.83	0.10	0.75	0.16											
6-Sep-06	82	50	T	330																
7-Sep-06	79	42.1	T	330																
8-Sep-06	72	45	0	330																
9-Sep-06	75.9	42.1	T	330																
10-Sep-06	73.9	37.9	0	330																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NC RTPZ-01	NC RTPZ-02	NC RTPZ-03	NC RTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	(°F)	Temp (°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
11-Sep-06	81	32	0	330																
12-Sep-06	82.9	34	0	330																
13-Sep-06	78.1	39.9	0	330	51	10.62	1.49	0.07	0.01											
14-Sep-06	55	43	0.01	330						5428.18	5427.52	5427.47	5426.37	5426.33	5426.51	5427.20	5426.79	5426.93	5426.78	5426.95
15-Sep-06	46	36	0.29	330																
16-Sep-06	41	33.1	0.11	330																
17-Sep-06	52	30	0	330																
18-Sep-06	66	24.1	0	330	46	9.58	1.12	0.10	0.02											
19-Sep-06	64	37.9	0	330																
20-Sep-06	52	44.1	T	330																
21-Sep-06	48	37.9	0.07	330						5428.25	5427.62	5427.54	5426.47	5426.46	5426.59	5427.26	5426.84	5427.02	5426.87	5427.05
22-Sep-06	48	37	0.01	330																
23-Sep-06	54	25	0	330																
24-Sep-06	62.1	28	0	330																
25-Sep-06	72	28.9	0	330	74.9	15.59	6.05	0.20	0.04											
26-Sep-06	68	28.9	0	330																
27-Sep-06	66.9	39	0	330																
28-Sep-06	73	30	0	330						5427.93	5427.31	5427.18	5426.00	5426.00	5426.11	5427.01	5426.60	5426.77	5426.63	5426.79
29-Sep-06	73.9	36	0	330																
30-Sep-06	75.9	30	0	330																
1-Oct-06	71.1	32	0	330																
2-Oct-06	66	30	0	330	22.8	4.75	0.37	0.42	0.09											
3-Oct-06	61	43	T	330																
4-Oct-06	64	37	0.1	330																
5-Oct-06	71.1	33.1	0	330						5428.01	5427.35	5427.26	5426.18	5426.13	5426.28	5426.99	5426.58	5426.74	5426.59	5426.76
6-Oct-06	64.9	44.1	0.23	330																
7-Oct-06	53.1	35.1	0.37	330																
8-Oct-06	51.1	30	0.32	330																
9-Oct-06	37	30	0.01	330	78.7	16.39	0.17	0.10	0.02											
10-Oct-06	46	21	0	330																
11-Oct-06	57	28.9	0	330																
12-Oct-06	63	24.1	0	330						5428.18	5427.52	5427.45	5426.37	5426.33	5426.48	5427.11	5426.72	5426.86	5426.72	5426.89
13-Oct-06	66	25	0	330																
14-Oct-06	64	28.9	0	330																
15-Oct-06	53.1	30	T	330																
16-Oct-06	42.1	27	0.48	330	30.7	6.39	2.03	0.39	0.08											
17-Oct-06	33.1	24.1	T	330																
18-Oct-06	44.1	19	T	330																
19-Oct-06	50	36	0.19	330																
20-Oct-06	39	27	0.32	330																
21-Oct-06	39.9	25	0.03	330																
22-Oct-06	48	19.9	0	330																
23-Oct-06	55	21	0	330	26.2	5.45	0.24	0.75	0.16											
24-Oct-06	53.1	21	T	330																
25-Oct-06	41	28.9	T	330																
26-Oct-06	48	21	0	330																
27-Oct-06	55.9	32	0	330																
28-Oct-06	63	30	0	330																
29-Oct-06	60.1	21	0.05	330																
30-Oct-06	21	-2	T	330	22.1	4.60	0.23	0.11	0.02											
31-Oct-06	24.1	-6	0	330																
1-Nov-06	35.1	-2.9	0	330																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precep.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NC RTPZ-01	NC RTPZ-02	NC RTPZ-03	NC RTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
2-Nov-06	45	7	0	330																
3-Nov-06	50	32	T	330																
4-Nov-06	50	30.9	0	330																
5-Nov-06	51.1	37.9	T	330																
6-Nov-06	61	43	0	330	39.4	8.20	0.69	0.50	0.10											
7-Nov-06	61	48.9	T	330																
8-Nov-06	53.1	24.1	T	330																
9-Nov-06	41	17.1	0.01	330						5428.33	5427.71	5427.62	5426.51	5426.53	5426.67	5427.42	5427.02	5427.20	5427.01	5427.17
10-Nov-06	41	10.9	0	330																
11-Nov-06	39	25	T	330																
12-Nov-06	39	19.9	0	330																
13-Nov-06	42.1	30	T	330	84.8	17.66	0.24	0.67	0.14											
14-Nov-06	34	24.1	0.01	330																
15-Nov-06	43	17.1	0	330																
16-Nov-06	45	19.9	T	330																
17-Nov-06	43	12.9	0	330																
18-Nov-06	45	14	0	330																
19-Nov-06	44.1	15.1	0	330																
20-Nov-06	53.1	24.1	0	330	54.7	11.39	0.70	0.60	0.13											
21-Nov-06	48.9	32	T	330																
22-Nov-06	45	23	0.07	330																
23-Nov-06	33.1	19	0.01	330																
24-Nov-06	35.1	19	0	330																
25-Nov-06	34	12	0.03	330																
26-Nov-06	35.1	8.1	0	330																
27-Nov-06	34	12.9	0.19	330	59.9	12.47	4.78	0.41	0.09											
28-Nov-06	12.9	-15	T	330																
29-Nov-06	12.9	-18.9	0	330																
30-Nov-06	28.9	-6	T	330																
1-Dec-06	25	15.1	T	330																
2-Dec-06	19.9	-9	T	330																
3-Dec-06	21	-8	0	330																
4-Dec-06	41	6.1	0	330	54.7	11.39	0.39	0.16	0.03											
5-Dec-06	37.9	15.1	T	330																
6-Dec-06	32	6.1	0	330																
7-Dec-06	36	8.1	0	330																
8-Dec-06	39.9	6.1	0	330																
9-Dec-06	41	9	0	330																
10-Dec-06	37	7	0.04	330																
11-Dec-06	39.9	21.9	0	330	47.8	9.95	0.23	0.25	0.05											
12-Dec-06	42.1	28	T	330																
13-Dec-06	44.1	28	0.01	330						5428.15	5427.52	5427.37	5426.28	5426.23	5426.43	5427.20	5426.78	5426.99	5426.85	5426.98
14-Dec-06	39	25	T	330																
15-Dec-06	45	19	0.07	330																
16-Dec-06	21.9	-7.1	0	330																
17-Dec-06	18	-13	0	330																
18-Dec-06	17.1	-14.1	T	330	44.4	9.24	0.41	0.33	0.07											
19-Dec-06	23	-5.1	0	330																
20-Dec-06	27	-2.9	0	330																
21-Dec-06	34	0	T	330																
22-Dec-06	28.9	0	0	330																
23-Dec-06	34	-2	0.02	330																



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[illegible]

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	Precip.	Flow	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
14-Feb-07	33.1	12	0.05	345																
15-Feb-07	41	26.1	0	345																
16-Feb-07	39.9	23	0	345																
17-Feb-07	46	12	0	345																
18-Feb-07	42.1	15.1	0	345																
19-Feb-07	33.1	21.9	0	345	36.5	7.94	0.61	0.48	0.11											
20-Feb-07	42.1	27	0.01	345																
21-Feb-07	35.1	19	0	345																
22-Feb-07	43	18	0.02	345																
23-Feb-07	33.1	5	0.1	345																
24-Feb-07	28	-4	0	345																
25-Feb-07	34	8.1	0	345																
26-Feb-07	28.9	1.9	0.04	345	36.3	7.90	0.27	0.26	0.06											
27-Feb-07	25	-2	0.02	345																
28-Feb-07	28.9	3	0.01	345																
1-Mar-07	24.1	3.9	0	345																
2-Mar-07	27	-0.9	0	345																
3-Mar-07	37.9	-2	0	345																
4-Mar-07	45	12.9	0	345																
5-Mar-07	44.1	15.1	0	345	32.8	7.14	0.19	0.24	0.05											
6-Mar-07	52	26.1	0	345																
7-Mar-07	53.1	19.9	0	345																
8-Mar-07	43	28.9	0.01	345																
9-Mar-07	46	27	0	345																
10-Mar-07	48.9	27	0	345																
11-Mar-07	57	30	0	345																
12-Mar-07	64	39.9	0	345	35.2	7.66	0.51	0.37	0.08											
13-Mar-07	52	36	0	345						5428.11	5427.38	5427.25	5425.95	5425.96	5426.17	5427.27	5426.89	5427.05	5427.06	5427.05
14-Mar-07	46	26.1	0	345																
15-Mar-07	46.9	18	0	345																
16-Mar-07	55	34	0	345																
17-Mar-07	64.9	28	0	345																
18-Mar-07	57	30	0	345																
19-Mar-07	61	24.1	0	345	48.5	10.56	0.53	0.12	0.03											
20-Mar-07	54	30.9	0	345																
21-Mar-07	46	27	0	345																
22-Mar-07	51.1	28	0	345																
23-Mar-07	55	28.9	0	345																
24-Mar-07	64.9	23	0	345																
25-Mar-07	59	30.9	0.03	345																
26-Mar-07	54	21.9	0.08	345	52.8	11.49	0.80	0.10	0.02											
27-Mar-07	39.9	32	0.17	345																
28-Mar-07	37	19.9	0.02	345																
29-Mar-07	43	12.9	0	345																
30-Mar-07	54	18	0	345																
31-Mar-07	51.1	25	0.01	345																
1-Apr-07	43	30.9	0.11	345																
2-Apr-07	36	25	0	345	42	9.14	0.28	0.14	0.03											
3-Apr-07	46	15.1	0	345																
4-Apr-07	50	28.9	0.05	345																
5-Apr-07	52	32	0	345																
6-Apr-07	46	30	0	345																

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
10-Sep-07	73	28	0	345																
11-Sep-07	79	33.1	0	345																
12-Sep-07	79	33.1	0	345																
13-Sep-07	64.9	35.1	0	345																
14-Sep-07	71.1	37	0	345	29.3	6.38	0.27	0.12	0.03	5427.66	5426.98	5426.84	5425.53	5425.57	5425.79	5426.85	5426.55	5426.66	5426.55	5426.68
15-Sep-07	78.1	36	0	345																
16-Sep-07	72	35.1	0	345																
17-Sep-07	55	33.1	0	345	29	6.31	0.22	0.09	0.02											
18-Sep-07	57.9	26.1	0.59	345																
19-Sep-07	46.9	37	0.04	345																
20-Sep-07	64	37.9	0	345																
21-Sep-07	68	32	0	345																
22-Sep-07	59	32	0.18	345																
23-Sep-07	46.9	35.1	0.54	345																
24-Sep-07	48	34	0	345	24.9	5.42	0.28	0.10	0.02											
25-Sep-07	57	28.9	0	345																
26-Sep-07	63	33.1	0	345																
27-Sep-07	69.1	28.9	0	345																
28-Sep-07	66	39	0.05	345																
29-Sep-07	46	28.9	0.24	345																
30-Sep-07	55	23	0	345																
1-Oct-07	48	32	0.04	345	25.7	5.59	0.35	0.10	0.02											
2-Oct-07	51.1	36	0	345																
3-Oct-07	48	27	0.04	345																
4-Oct-07	48.9	23	0	345																
5-Oct-07	36	32	0.52	345																
6-Oct-07	39.9	32	0.01	345																
7-Oct-07	53.1	28	0	345																
8-Oct-07	61	34	0	345	36.3	7.90	0.28	0.12	0.03											
9-Oct-07	68	28	0	345																
10-Oct-07	70	32	0.09	345																
11-Oct-07	54	34	0	345</																

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[illegible]



BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	(°F)	(°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
13-Feb-08	41	21.9	0.01	345																
14-Feb-08	30.9	6.1	0	345																
15-Feb-08	37	10	0	345																
16-Feb-08	37	21.9	0	345																
17-Feb-08	30.9	10	0	345																
18-Feb-08	33.1	1.9	0	345	33.7	7.34	0.33	0.12	0.03											
19-Feb-08	39	1.9	0	345																
20-Feb-08	39	1.9	0	345																
21-Feb-08	43	3.9	0	345																
22-Feb-08	43	6.1	0	345																
23-Feb-08	39	12	0	345																
24-Feb-08	35.1	21.9	0.06	345																
25-Feb-08	33.1	7	0.23	345	38.1	8.29	0.36	0.18	0.04											
26-Feb-08	34	8.1	0	345																
27-Feb-08	39	9	0	345																
28-Feb-08	42.1	24.1	0	345																
1-Mar-08	39.9	19.9	0.03	345																
2-Mar-08	33.1	14	0	345																
3-Mar-08	39	6.1	0	345	25.2	5.49	0.31	0.09	0.02	5427.70	5426.97	5426.81	5425.58	5425.57	5425.82	5427.05	5426.87	5427.01	5426.92	5426.94
4-Mar-08	32	8.1	0	345																
5-Mar-08	30	5	0	345																
6-Mar-08	37	6.1	0	345																
7-Mar-08	41	5	0	345																
8-Mar-08	39	9	0	345																
9-Mar-08	44.1	18	0	345																
10-Mar-08	50	12.9	0	345	27.6	6.01	0.23	0.13	0.03											
11-Mar-08	48	28.9	0	345																
12-Mar-08	43	21.9	0	345																
13-Mar-08	37.9	19.9	0.02	345																
14-Mar-08	36	19	0.05	345																
15-Mar-08	37	12.9	0	345																
16-Mar-08	37	19	0	345																
17-Mar-08	39.9	19.9																		

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[illegible]

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
28-May-08	62.1	35.1	0.14	345																
29-May-08	57.9	35.1	0.23	345																
30-May-08	60.1	39	0.01	345																
31-May-08	66	36	0.01	345																
1-Jun-08	64.9	37.9	0.18	345																
2-Jun-08	63	37	0.01	345	56.9	12.38	0.31	0.13	0.03	5428.27	5427.55	5427.44	5426.26	5426.25	5426.48	5427.60	5427.35	5427.50	5427.36	5427.44
3-Jun-08	62.1	30.9	0.04	345																
4-Jun-08	45	33.1	1.35	345																
5-Jun-08	60.1	39.9	0.05	345																
6-Jun-08	51.1	34	0.07	345																
7-Jun-08	52	34	0.01	345																
8-Jun-08	53.1	36	0.14	345																
9-Jun-08	61	30	0.02	345	34.1	7.42	0.38	0.18	0.04											
10-Jun-08	55	32	0.02	345																
11-Jun-08	41	30.9	0.35	345																
12-Jun-08	54	36	0.01	345																
13-Jun-08	66.9	30	0	345																
14-Jun-08	70	35.1	0	345																
15-Jun-08	73	33.1	0	345																
16-Jun-08	75.9	36	0	345	85.2	18.54	7.70	2.58	0.56											
17-Jun-08	81	39.9	0.01	345																
18-Jun-08	75	37.9	0	345																
19-Jun-08	71.1	36	0	345																
20-Jun-08	77	37	0	345																
21-Jun-08	84.9	42.1	0.02	345																
22-Jun-08	73.9	48	0.06	345																
23-Jun-08	77	42.1	0	345	16.7	3.63	0.27	0.33	0.07											
24-Jun-08	75.9	46	0	345																
25-Jun-08	79	37.9	0	345																
26-Jun-08	75	45	0	345																
27-Jun-08	75	41	0	345																
28-Jun-08	82	41																		

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
19-Jul-08	80.1	37	0	345																
20-Jul-08	88	39	0	345																
21-Jul-08	90	44.1	0	345	33.7	7.34	0.25	0.12	0.03											
22-Jul-08	75	51.1	0.39	345																
23-Jul-08	80.1	44.1	0	345																
24-Jul-08	78.1	46	0	345																
25-Jul-08	87.1	41	0	345																
26-Jul-08	90	50	0	345																
27-Jul-08	84.9	46.9	0	345																
28-Jul-08	82.9	44.1	0	345	37.1	8.08	0.30	0.11	0.02											
29-Jul-08	86	44.1	0	345																
30-Jul-08	77	48.9	0	345																
31-Jul-08	84	36	0	345																
1-Aug-08	88	44.1	0	345																
2-Aug-08	79	46	0.07	345																
3-Aug-08	78.1	39	0	345																
4-Aug-08	80.1	39	0	345	51.9	11.30	0.30	0.15	0.03											
5-Aug-08	86	42.1	0	345																
6-Aug-08	87.1	42.1	0	345																
7-Aug-08	87.1	53.1	0.24	345																
8-Aug-08	78.1	50	0.01	345																
9-Aug-08	78.1	46.9	0.13	345																
10-Aug-08	81	43	0	345																
11-Aug-08	75	37.9	0	345	53.6	11.67	0.27	0.18	0.04											
12-Aug-08	79	37.9	0	345																
13-Aug-08	75.9	43	0	345																
14-Aug-08	77	42.1	0	345						5427.80	5427.13	5427.07	5425.81	5425.82	5426.05	5427.27	5427.03	5427.21	5427.06	5427.11
15-Aug-08	75.9	39.9	0	345																
16-Aug-08	87.1	41	0	345																
17-Aug-08	84.9	42.1	0	345																
18-Aug-08	90	51.1	0	345	69.8	15.19	1.37	0.36	0.08											
19-Aug-08	89.1	52																		

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NC RTPZ-01	NC RTPZ-02	NC RTPZ-03	NC RTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NH RTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
9-Sep-08	72	30.9	0	345																
10-Sep-08	50	36	0.04	345																
11-Sep-08	64.9	27	0	345																
12-Sep-08	73.9	30.9	0	345																
13-Sep-08	62.1	34	0	345																
14-Sep-08	73	28.9	0	345																
15-Sep-08	80.1	32	0	345	56.2	12.23	0.71	0.29	0.06											
16-Sep-08	81	34	0	345																
17-Sep-08	79	34	0	345																
18-Sep-08	80.1	33.1	0	345						5427.70	5427.02	5426.84	5425.69	5425.71	5425.94	5427.12	5426.89	5427.05	5426.91	5426.98
19-Sep-08	79	36	0	345																
20-Sep-08	70	36	0	345																
21-Sep-08	55	37.9	0.14	345																
22-Sep-08	55.9	35.1	0.03	345	43.8	9.53	0.31	0.17	0.04											
23-Sep-08	55.9	32	0	345																
24-Sep-08	71.1	28	0	345																
25-Sep-08	70	34	0	345																
26-Sep-08	70	28	0	345																
27-Sep-08	72	30	0	345																
28-Sep-08	70	30.9	0	345																
29-Sep-08	75.9	27	0	345	47.9	10.43	0.28	0.20	0.04											
30-Sep-08	81	30	0	345																
1-Oct-08	79	37.9	0	345																
2-Oct-08	78.1	34	0	345																
3-Oct-08	64.9	42.1	0	345																
4-Oct-08	57	42.1	0.12	345																
5-Oct-08	52	33.1	0	345																
6-Oct-08	55.9	27	0	345	43	9.36	0.64	0.23	0.05											
7-Oct-08	64	28	0	345																
8-Oct-08	46.9	21	0	345																
9-Oct-08	41	12.9	0	345						5427.59	5426.91	5426.69	5425.57	5425.58	5425.83	5427.04	5426.82	5426.98	5426.84	5426.90</

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
31-Oct-08	66	28.9	0	345																
1-Nov-08	61	27	0	345																
2-Nov-08	48	36	0.34	345																
3-Nov-08	46	30.9	0	345	47.5	10.34	0.46	0.20	0.04											
4-Nov-08	42.1	30	0.13	345																
5-Nov-08	34	15.1	0	345																
6-Nov-08	39	7	0	345						5427.66	5426.95	5426.84	5425.56	5425.57	5425.80	5427.05	5426.78	5426.93	5426.83	5426.91
7-Nov-08	45	32	0.06	345																
8-Nov-08	48.9	34	0	345																
9-Nov-08	48	28	0	345																
10-Nov-08	42.1	28	0.05	345																
11-Nov-08	39.9	27	0	345																
12-Nov-08	54	37	0	345	43.4	9.45	0.92	0.18	0.04											
13-Nov-08	46.9	26.1	0.29	345																
14-Nov-08	36	12.9	0	345																
15-Nov-08	46	25	0	345																
16-Nov-08	57	26.1	0	345																
17-Nov-08	57	23	0	345	34.1	7.42	0.34	0.16	0.03											
18-Nov-08	62.1	30	0	345																
19-Nov-08	39	27	0	345																
20-Nov-08	37	26.1	0.12	345																
21-Nov-08	36	12	0	345																
22-Nov-08	39.9	12	0	345																
23-Nov-08	35.1	10	0	345																
24-Nov-08	45	6.1	0	345	56	12.19	1.62	0.27	0.06											
25-Nov-08	39	8.1	0	345																
26-Nov-08	42.1	12	0	345																
27-Nov-08	37.9	6.1	0	345																
28-Nov-08	37.9	17.1	0	345																
29-Nov-08	39	33.1	0	345																
30-Nov-08	45	28	0	345																
1-Dec-08	52	23	0	345	48	10.45	0.38	0.16	0.0											

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
22-Dec-08	21	1	0	345		66.9	14.56	0.84	0.29	0.06										
23-Dec-08	10	-11.9	0	345																
24-Dec-08	25	-13	0	345																
25-Dec-08	27	15.1	0	345																
26-Dec-08	18	-5.1	0	345																
27-Dec-08	32	0	0	345																
28-Dec-08	42.1	28	0.33	345																
29-Dec-08	43	21	0.1	345	72.6	15.80	0.64	0.28	0.06											
30-Dec-08	25	1.9	0	345																
31-Dec-08	37.9	9	0	345																
1-Jan-09	35.1	15.1	0.06	345																
2-Jan-09	42.1	12.9	0.03	345																
3-Jan-09	15.1	-13	0	345																
4-Jan-09	10	-20.9	0	345																
5-Jan-09	30	3	0	345	87	18.94	0.29	0.23	0.05	5427.86	5427.15	5427.04	5425.79	5425.82	5426.06	5427.49	5427.31	5427.48	5427.29	5427.33
6-Jan-09	39	23	0	345																
7-Jan-09	43	37	0	345																
8-Jan-09	43	28.9	0	345																
9-Jan-09	34	24.1	0	345																
10-Jan-09	35.1	24.1	0	345																
11-Jan-09	39.9	27	0.02	345																
12-Jan-09	37	23	0.01	345	81.5	17.74	0.52	0.22	0.05											
13-Jan-09	44.1	28	0	345																
14-Jan-09	42.1	23	0	345																
15-Jan-09	43	19.9	0	345																
16-Jan-09	42.1	10	0	345																
17-Jan-09	39	8.1	0	345																
18-Jan-09	37	5	0	345																
19-Jan-09	39	3	0	345																
20-Jan-09	44.1	1	0	345	56.5	12.30	0.31	0.16	0.03											
21-Jan-09	42.1	6.1	0	345																
22-Jan-09	37	15.1	0	345																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
12-Feb-09	30	5	0	345																
13-Feb-09	28.9	1.9	0	345																
14-Feb-09	28	10.9	0	345																
15-Feb-09	30.9	3.9	0	345																
16-Feb-09	39	17.1	0	345																
17-Feb-09	39	21.9	0	345	40.1	8.73	0.41	0.18	0.04											
18-Feb-09	36	28	0	345																
19-Feb-09	41	23	0	345																
20-Feb-09	37.9	18	0	345																
21-Feb-09	46	10.9	0	345																
22-Feb-09	48.9	14	0	345																
23-Feb-09	51.1	34	0	345	51.6	11.23	0.99	0.28	0.06											
24-Feb-09	45	26.1	0.05	345																
25-Feb-09	42.1	27	0.02	345																
26-Feb-09	35.1	18	0.15	345																
27-Feb-09	28.9	3.9	0	345						5428.50	5427.81	5427.62	5426.53	5426.54	5426.76	5428.82	5428.80	5428.97	5428.82	5428.67
28-Feb-09	37.9	-2	0	345																
1-Mar-09	53.1	21	0	345																
2-Mar-09	54	25	0	345	149	32.43	18.70	7.13	1.55											
3-Mar-09	46.9	25	0.07	345																
4-Mar-09	35.1	21	0	345																
5-Mar-09	35.1	25	0	345						5428.65	5427.96	5427.76	5426.75	5426.73	5427.00	5429.06	5428.87	5429.03	5428.89	5428.76
6-Mar-09	28.9	8.1	0	345																
7-Mar-09	37.9	7	0	345																
8-Mar-09	26.1	7	0.2	345																
9-Mar-09	15.1	-7.1	0	345	98.4	21.42	1.80	0.53	0.12											
10-Mar-09	23	-5.1	0	345																
11-Mar-09	28.9	-7.1	0	345																
12-Mar-09	35.1	-2.9	0	345																
13-Mar-09	48	6.1	0	345																
14-Mar-09	46.9	19	0	345																
15-Mar-09	46.9	25	0	345																
16-Mar-09	44.1	27	0.36	345	145	31.56	13.10	2.85	0.62											
17-Mar-09	36	25	0	345																
18-Mar-09	44.1	15.1	0	345																
19-Mar-09	50	21.9	0	345																
20-Mar-09	55.9	26.1	0	345																
21-Mar-09	52	28.9	0.1	345																
22-Mar-09	46	30	0.07	345																
23-Mar-09	36	26.1	0.01	345	153	33.30	1.94	0.52	0.11											
24-Mar-09	37	18	0.01	345																
25-Mar-09	34	12.9	0.01	345																
26-Mar-09	26.1	9	0	345																
27-Mar-09	43	10	0	345																
28-Mar-09	43	32	0	345																
29-Mar-09	35.1	21	0.43	345																
30-Mar-09	32	12	0	345	101	21.98	1.10	0.29	0.06											
31-Mar-09	35.1	19	0	345																
1-Apr-09	36	19.9	0.01	345																
2-Apr-09	39.9	26.1	0.03	345																
3-Apr-09	36	23	0	345																
4-Apr-09	35.1	25	0	345																





Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
27-May-09	73	35.1	0	335																
28-May-09	77	35.1	0	335																
29-May-09	80.1	37	0	335																
30-May-09	77	39.9	0	335																
31-May-09	77	41	0	335																
1-Jun-09	53.1	42.1	0.11	335	88.7	18.75	0.78	0.27	0.06	5428.12	5427.43	5427.31	5426.18	5426.22	5426.47	5428.51	5427.95	5428.07	5427.97	5427.89
2-Jun-09	48	44.1	0.02	335																
3-Jun-09	66.9	39.9	0	335																
4-Jun-09	70	37	0.07	335																
5-Jun-09	68	48	0.6	335																
6-Jun-09	48.9	35.1	0.23	335																
7-Jun-09	48	33.1	0.01	335																
8-Jun-09	52	36	0.12	335	82.4	17.42	0.47	0.23	0.05											
9-Jun-09	57.9	37	0	335																
10-Jun-09	62.1	39.9	0	335																
11-Jun-09	66	34	0.08	335																
12-Jun-09	71.1	34	0	335																
13-Jun-09	70	39	0	335																
14-Jun-09	64	46	0.17	335																
15-Jun-09	63	45	0.02	335	87.1	18.41	0.36	0.28	0.06											
16-Jun-09	71.1	43	0	335																
17-Jun-09	68	48.9	0.26	335																
18-Jun-09	64.9	42.1	0	335																
19-Jun-09	70	41	0.15	335																
20-Jun-09	50	46.9	0.43	335																
21-Jun-09	66	46	0.14	335																
22-Jun-09	55.9	39.9	0.06	335	81	17.12	0.62	0.36	0.08											
23-Jun-09	71.1	30	0	335																
24-Jun-09	81	36	0	335																
25-Jun-09	84.9	46	0.01	335																
26-Jun-09	73	39.9	0	335																
27-Jun-09	73	35.1	0	335																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

[illegible]

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
8-Sep-09	66.9	30	0	335		47.4	0.56	0.48	0.10											
9-Sep-09	75.9	30	0	335																
10-Sep-09	73.9	39.9	0	335																
11-Sep-09	72	34	0	335																
12-Sep-09	75	39.9	0	335																
13-Sep-09	71.1	35.1	0	335																
14-Sep-09	79	39	0	335	37.6	7.95	0.35	0.09	0.02											
15-Sep-09	80.1	48	0	335																
16-Sep-09	82.9	48	0	335																
17-Sep-09	80.1	44.1	0	335																
18-Sep-09	82.9	44.1	0	335																
19-Sep-09	86	43	0	335																
20-Sep-09	55.9	36	0.01	335																
21-Sep-09	64.9	26.1	0	335	33.9	7.16	0.29	0.22	0.05											
22-Sep-09	75.9	30.9	0	335																
23-Sep-09	82.9	34	0	335																
24-Sep-09	84.9	36	0	335																
25-Sep-09	81	37	0	335																
26-Sep-09	78.1	33.1	0	335																
27-Sep-09	66	36	0	335																
28-Sep-09	78.1	34	0	335	32.3	6.83	0.29	0.10	0.02											
29-Sep-09	73	37	0.19	335																
30-Sep-09	41	32	0.51	335																
1-Oct-09	42.1	27	0	335																
2-Oct-09	48.9	26.1	0	335																
3-Oct-09	50	27	0.01	335																
4-Oct-09	39	30	0	335																
5-Oct-09	39.9	24.1	0	335	25.9	5.47	0.30	0.12	0.03											
6-Oct-09	53.1	17.1	0	335						5427.61	5426.87	5426.67	5425.43	5425.43	5425.65	5427.57	5427.10	5427.15	5427.15	5427.16
7-Oct-09	42.1	27	0.03	335																
8-Oct-09	41	21	0.07	335																
9-Oct-09	21.9	12	0	335																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NC RTPZ-01	NC RTPZ-02	NC RTPZ-03	NC RTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NH RTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
30-Oct-09	50	30	0	335																
31-Oct-09	55	39	0	335																
1-Nov-09	44.1	23	0	335																
2-Nov-09	48	16	0	335	33.6	7.10	0.31	0.08	0.02											
3-Nov-09	46	19.9	0	335																
4-Nov-09	59	19	0	335																
5-Nov-09	62.1	21	0	335																
6-Nov-09	53.1	28	0	335																
7-Nov-09	44.1	24.1	0	335																
8-Nov-09	43	19	0	335																
9-Nov-09	48	12.9	0	335	28.7	6.07	0.49	0.20	0.04											
10-Nov-09	50	21	0	335						5427.18	5426.39	5426.14	5424.84	5424.83	5425.05	5426.65	5426.51	5426.65	5426.63	5426.62
11-Nov-09	41	19.9	0.09	335																
12-Nov-09	30.9	1.9	0.06	335																
13-Nov-09	27	-5.1	0	335																
14-Nov-09	28	-0.9	0	335																
15-Nov-09	28.9	-4	0	335																
16-Nov-09	36	9	0	335	32.2	6.81	0.35	0.20	0.04											
17-Nov-09	50	16	0	335																
18-Nov-09	36	15.1	0	335																
19-Nov-09	46	10	0	335																
20-Nov-09	46	21	0	335																
21-Nov-09	37.9	14	0	335																
22-Nov-09	30	7	0	335																
23-Nov-09	34	15.1	0	335	26.9	5.69	0.25	0.20	0.04											
24-Nov-09	39	16	0	335																
25-Nov-09	48	14	0	335																
26-Nov-09	46.9	18	0	335																
27-Nov-09	39.9	19.9	0.01	335																
28-Nov-09	37	17.1	0	335																
29-Nov-09	39.9	21.9	0	335																
30-Nov-09	48.9	14	0	335	27.1	5.73	0.29	0.20	0.04											

[illegible]

[illegible]

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
4-Apr-10	41	18	0	335																
5-Apr-10	43	19.9	0	335	14.7	3.11	<0.2	0.42	0.09											
6-Apr-10	39	21.9	0.01	335																
7-Apr-10	48	21	0	335																
8-Apr-10	48	23	0.02	335																
9-Apr-10	37.9	17.1	0	335																
10-Apr-10	48.9	12.9	0	335																
11-Apr-10	45	33.1	0	335																
12-Apr-10	54	30	0	335	14.2	3.00	<0.2	0.20	0.04											
13-Apr-10	36	30	0.36	335																
14-Apr-10	51.1	30.9	0	335																
15-Apr-10	55.9	26.1	0	335																
16-Apr-10	64	33.1	0	335																
17-Apr-10	59	33.1	0	335																
18-Apr-10	64	28.9	0	335																
19-Apr-10	69.1	27	0	335	16	3.38	0.15	0.20	0.04											
20-Apr-10	70	35.1	0	335																
21-Apr-10	70	42.1	0	335																
22-Apr-10	63	37	0.18	335																
23-Apr-10	55	30	0	335																
24-Apr-10	55.9	25	0	335																
25-Apr-10	44.1	23	0	335																
26-Apr-10	55.9	18	0	335	16.8	3.55	0.23	0.20	0.04											
27-Apr-10	64	37	0.11	335						5427.51	5426.80	5426.64	5425.47	5425.46	5425.65	5429.46	5428.99	5429.12	5428.99	5428.93
28-Apr-10	41	33.1	0	335																
29-Apr-10	36	28.9	0.28	335																
30-Apr-10	43	28	0.13	335																
1-May-10	42.1	32	0.03	335																
2-May-10	48.9	30	0	335																
3-May-10	57	28.9	0.09	335	18.4	3.89	2.04	1.12	0.24											
4-May-10	39	21.9	0	335																
5-May-10	37.9	15.1	0																	



BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

[illegible]

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
17-Jul-10	86	44.1	0	335																
18-Jul-10	84	43	0	335																
19-Jul-10	78.1	42.1	0	335	78.7	16.63	0.50	0.22	0.05											
20-Jul-10	79	39	0	335																
21-Jul-10	81	44.1	0.18	335																
22-Jul-10	79	44.1	0	335																
23-Jul-10	75	46.9	0	335																
24-Jul-10	84.9	41	0	335																
25-Jul-10	89.1	45	0	335																
26-Jul-10	79	48.9	0	335	69.7	14.73	0.72	0.28	0.06											
27-Jul-10	70	55.9	0.14	335																
28-Jul-10	84	48	0.04	335																
29-Jul-10	84	46.9	0	335						5428.38	5427.72	5427.56	5426.64	5426.63	5426.90	5428.38	5427.88	5428.01	5427.93	5427.94
30-Jul-10	88	50	0	335																
31-Jul-10	84.9	51.1	0.12	335																
1-Aug-10	81	48	0	335																
2-Aug-10	79	43	0	335	70.3	14.86	0.55	0.36	0.08											
3-Aug-10	80.1	44.1	0.06	335																
4-Aug-10	75.9	46.9	0	335																
5-Aug-10	87.1	48	0.01	335																
6-Aug-10	82.9	46.9	0.11	335																
7-Aug-10	80.1	52	0.04	335																
8-Aug-10	80.1	43	0.18	335																
9-Aug-10	75	45	0.05	335	67.6	14.29	0.56	0.39	0.08	5428.28	5427.62	5427.45	5426.50	5426.52	5426.77	5428.27	5427.79	5427.93	5427.85	5427.91
10-Aug-10	73	52	0.51	335																
11-Aug-10	73	46.9	0.09	335																
12-Aug-10	70	41	0	335																
13-Aug-10	62.1	44.1	0.17	335																
14-Aug-10	68	43	0.01	335																
15-Aug-10	75.9	39	0	335																
16-Aug-10	81	41	0	335	66.9	14.14	0.													



Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
29-Oct-10	55	25	0	335																
30-Oct-10	51.1	21.9	0	335																
31-Oct-10	48	23	0	335																
1-Nov-10	53.1	19	0	335	40.8	8.62	0.26	0.12	0.03											
2-Nov-10	59	27	0	335																
3-Nov-10	55.9	19	0	335																
4-Nov-10	64.9	21	0	335																
5-Nov-10	66	21.9	0	335																
6-Nov-10	64	28	0	335																
7-Nov-10	60.1	27	0.03	335																
8-Nov-10	43	28.9	0.13	335	62.2	13.15	0.33	0.28	0.06	5428.04			5426.31		5426.58	5427.92	5427.50		5427.48	
9-Nov-10	33.1	16	0	335																
10-Nov-10	30	12.9	0	335																
11-Nov-10	33.1	19	0	335																
12-Nov-10	37.9	19	0	335																
13-Nov-10	34	27	0	335																
14-Nov-10	37.9	30	0.04	335																
15-Nov-10	43	33.1	0.07	335	72.5	15.32	0.71	0.43	0.09											
16-Nov-10	41	19	0.11	335																
17-Nov-10	42.1	19	0	335																
18-Nov-10	48	26.1	0	335																
19-Nov-10	27	21	0.03	335																
20-Nov-10	21.9	-6	0.03	335																
21-Nov-10	19	-9.9	0	335																
22-Nov-10	18	1	0	335	42	8.88	0.67	0.37	0.08											
23-Nov-10	8.1	-9	0.06	335																
24-Nov-10	3	-22	0	335																
25-Nov-10	19	-18.9	0	335																
26-Nov-10	28.9	1.9	0	335																
27-Nov-10	35.1	7	0	335																
28-Nov-10	25	15.1	0	335																
29-Nov-10	23	-7.1	0	335	46.6	9.85	0.68	0.33	0.07											
30-Nov-10	28	-9	0	335						5427.52	5426.92		5425.79	5425.80	5426.09					

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
10-Feb-11	33.1	14	0	335																
11-Feb-11	42.1	18	0	335																
12-Feb-11	51.1	30.9	0	335																
13-Feb-11	46.9	25	0	335																
14-Feb-11	46.9	16	0	335	25.09	5.30	1.12	0.33	0.07											
15-Feb-11	48	34	0	335																
16-Feb-11	41	25	0.04	335																
17-Feb-11	30	10.9	0.02	335																
18-Feb-11	36	14	0	335																
19-Feb-11	26.1	6.1	0.02	335																
20-Feb-11	10.9	1.9	0.08	335																
21-Feb-11	27	-7.1	0	335	32.4	6.85	0.47	0.78	0.17											
22-Feb-11	27	10	0	335																
23-Feb-11	24.1	3.9	0	335																
24-Feb-11	5	-14.1	0.01	335																
25-Feb-11	3	-22	0	335																
26-Feb-11	23	-25.1	0	335																
27-Feb-11	30	-0.9	0	335																
28-Feb-11	33.1	16	0	335	37.1	7.84	1.04	0.29	0.06											
1-Mar-11	42.1	21	0	335						5427.56	5426.89		5425.67	5425.69	5426.02	5428.31	5427.89		5427.88	
2-Mar-11	43	14	0	335																
3-Mar-11	37	18	0	335																
4-Mar-11	37.9	15.1	0	335																
5-Mar-11	39	21.9	0	335																
6-Mar-11	34	21.9	0.04	335																
7-Mar-11	35.1	18	0	335	55	11.62	4.92	0.44	0.09											
8-Mar-11	35.1	10	0	335																
9-Mar-11	41	19.9	0	335																
10-Mar-11	46.9	24.1	0.02	335																
11-Mar-11	37	24.1	0	335																
12-Mar-11	41	14	0	335																
13-Mar-11	46.9	23	0	335																
14-Mar-11	41	26.1	0.03	335	51	10.78	0.50	0.35	0.07											
15-Mar-11	45	21.9	0.02	335																
16-Mar-11	39	30	0.07	335																
17-Mar-11	37	21	0	335																
18-Mar-11	42.1	17.1	0	335																
19-Mar-11	44.1	18	0.08	335																
20-Mar-11	39.9	8.1	0	335																
21-Mar-11	43	30	0	335	64.6	13.65	0.69	0.33	0.07											
22-Mar-11	37.9	23	0.1	335																
23-Mar-11	42.1	15.1	0	335																
24-Mar-11	43	26.1	0	335																
25-Mar-11	37.9	23	0.02	335																
26-Mar-11	42.1	21.9	0	335																
27-Mar-11	36	25	0.21	335									5425.86	5425.87		5427.64	5427.25		5427.25	
28-Mar-11	39.9	19.9	0.02	335	47	9.93	0.57	0.28	0.06											
29-Mar-11	39.9	18	0	335						5427.89	5427.23		5426.12	5426.14	5426.47	5427.41	5427.02		5427.02	
30-Mar-11	52	34	0	335																
31-Mar-11	51.1	39	0	335																
1-Apr-11	55.9	35.1	0	335																
2-Apr-11	52	28	0.04	335																

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NC RTPZ-01	NC RTPZ-02	NC RTPZ-03	NC RTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NH RTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
3-Apr-11	34	23	0.04	335																
4-Apr-11	45	23	0	335	59	12.47	6.83	2.54	0.54											
5-Apr-11	43	28	0.09	335																
6-Apr-11	39.9	24.1	0.01	335																
7-Apr-11	32	24.1	0.01	335																
8-Apr-11	32	23	0.1	335																
9-Apr-11	42.1	18	0.02	335																
10-Apr-11	48	26.1	0	335																
11-Apr-11	55	28.9	0.04	335	54.4	11.50	0.71	1.16	0.25											
12-Apr-11	46.9	27	0	335																
13-Apr-11	46.9	24.1	0.41	335																
14-Apr-11	39.9	24.1	0	335																
15-Apr-11	46.9	23	0	335																
16-Apr-11	53.1	33.1	0.01	335																
17-Apr-11	48.9	30.9	0	335																
18-Apr-11	37.9	24.1	0.01	335	58.1	12.28	0.49	0.27	0.06											
19-Apr-11	33.1	12	0.01	335																
20-Apr-11	46.9	12	0	335																
21-Apr-11	46	21.9	0.03	335																
22-Apr-11	36	19	0	335																
23-Apr-11	48	16	0	335																
24-Apr-11	54	19	0	335																
25-Apr-11	48.9	21.9	0.02	335	45.8	9.68	0.64	0.26	0.05											
26-Apr-11	42.1	30	0	335																
27-Apr-11	50	24.1	0	335																
28-Apr-11	48.9	25	0	335						5427.45	5426.78		5425.62	5425.62	5425.94	5427.10	5426.76		5426.76	
29-Apr-11	34	19	0.01	335																
30-Apr-11	45	26.1	0.04	335																
1-May-11	46.9	25	0	335																
2-May-11	61	19	0	335	47.9	10.12	0.55	0.26	0.05											
3-May-11	46	30	0	335																
4-May-11	53.1	28	0	335																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

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BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRT-PZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	(°F)	Temp (°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	
6-Sep-11	80.1	35.1	0	430	28.4	7.70	0.67	0.39	0.11											
7-Sep-11	80.1	37	0	430																
8-Sep-11	75.9	44.1	0	430																
9-Sep-11	81	42.1	0	430																
10-Sep-11	80.1	37.9	0	430																
11-Sep-11	81	37.9	0	430																
12-Sep-11	81	37	0	430	11.2	3.04	0.57	0.64	0.17	5426.03	5425.19		5423.31	5423.38	5424.13	5426.72	5426.47		5427.85	
13-Sep-11	78.1	37.9	0	430																
14-Sep-11	70	39.9	0	430																
15-Sep-11	73.9	35.1	0.04	430																
16-Sep-11	61	41	0.34	430																
17-Sep-11	61	35.1	0	430																
18-Sep-11	64	43	0	430																
19-Sep-11	64.9	35.1	0.02	430	23.6	6.40	0.45	0.36	0.10											
20-Sep-11	63	28.9	0	430																
21-Sep-11	73.9	28.9	0	430																
22-Sep-11	80.1	32	0	430																
23-Sep-11	82.9	37	0	430																
24-Sep-11	81	35.1	0	430																
25-Sep-11	82.9	37.9	0	430																
26-Sep-11	73.9	44.1	0	430	9.14	2.48	0.63	0.39	0.11											
27-Sep-11	79	39	0	430																
28-Sep-11	66.9	36	0	430																
29-Sep-11	72	30	0	430																
30-Sep-11	81	34	0	430																
1-Oct-11	81	37.9	0	430																
2-Oct-11	75.9	39	0	430																
3-Oct-11	78.1	34	0	430	21.1	5.72	0.56	0.46	0.13											
4-Oct-11	64.9	46	0.23	430						5426.10	5425.27		5423.43	5423.54	5424.40	5427.63	5427.63		5427.91	
5-Oct-11	57	45	0.08	430																
6-Oct-11	51.1	41	0.04	430																
7-Oct-11	48.9	39.9	0.01	430																
8-Oct-11	51.1	30	0	430																
9-Oct-11	57	25	0	430																
10-Oct-11	55.9	28.9	0	430	34.3	9.31	1.41	0.61	0.17	5426.11	5425.28		5423.46	5423.52	5424.26					
11-Oct-11	50	39.9	0.08	430																
12-Oct-11	53.1	36	0	430																
13-Oct-11	51.1	30	0	430																
14-Oct-11	64	37	0.04	430																
15-Oct-11	53.1	37	0.02	430																
16-Oct-11	54	35.1	0.09	430																
17-Oct-11	51.1	25	0	430	45.7	12.40	0.92	0.66	0.18											
18-Oct-11	57.9	19.9	0	430																
19-Oct-11	55.9	21.9	0	430																
20-Oct-11	59	26.1	0	430																
21-Oct-11	54	33.1	0	430																
22-Oct-11	57	33.1	0	430																
23-Oct-11	60.1	44.1	0	430																
24-Oct-11	44.1	30	0.13	430	63.1	17.12	1.05	0.93	0.25											
25-Oct-11	37.9	18	0	430																
26-Oct-11	42.1	17.1	0	430																
27-Oct-11	43	19.9	0	430						5426.71	5425.87		5423.90	5423.97	5424.63	5428.31	5428.12		5428.15	

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
28-Oct-11	52	12.9	0	430																
29-Oct-11	46.9	27	0	430																
30-Oct-11	60.1	19.9	0	430																
31-Oct-11	50	26.1	0	430	83.8	22.73	1.32	0.89	0.24											
1-Nov-11	35.1	10	0	430																
2-Nov-11	42.1	3	0	430																
3-Nov-11	48	16	0	430																
4-Nov-11	51.1	17.1	0.01	430																
5-Nov-11	28.9	3.9	0.04	430																
6-Nov-11	30	-6	0	430																
7-Nov-11	32	-2	0	340	85.2	18.28	1.17	0.20	0.04	5427.77	5427.11		5426.01	5426.00	5426.32	5427.61	5427.26		5427.36	
8-Nov-11	36	15.1	0	340																
9-Nov-11	39.9	9	0	340																
10-Nov-11	46.9	10.9	0	340																
11-Nov-11	53.1	15.1	0	340																
12-Nov-11	39	25	0.12	340																
13-Nov-11	37.9	28	0	340																
14-Nov-11	35.1	24.1	0	340	81.6	17.50	0.83	0.34	0.07											
15-Nov-11	26.1	3.9	0.01	340																
16-Nov-11	26.1	-9.9	0	340																
17-Nov-11	39.9	16	0.01	340																
18-Nov-11	28.9	3	0.02	340																
19-Nov-11	17.1	-8	0.01	340																
20-Nov-11	28.9	-5.1	0	340																
21-Nov-11	39.9	12	0	340	74.1	15.89	0.64	0.33	0.07											
22-Nov-11	44.1	15.1	0	340																
23-Nov-11	46	32	0	340																
24-Nov-11	42.1	28.9	0	340																
25-Nov-11	37.9	19.9	0.03	340																
26-Nov-11	35.1	3	0	340																
27-Nov-11	48.9	10	0	340																
28-Nov-11	48	21.9	0	340	75.9	16.28	1.03													

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NC RTPZ-01	NC RTPZ-02	NC RTPZ-03	NC RTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NH RTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
9-Feb-12	42.1	23	T	340																
10-Feb-12	32	21	0.07	340																
11-Feb-12	32	12	T	340																
12-Feb-12	36	10	T	340																
13-Feb-12	33.1	25	0	340	61.7	13.24	0.59	0.37	0.08											
14-Feb-12	32	12.9	0.01	340						5427.57	5426.92		5425.83	5425.85	5426.11	5429.06	5429.04		5429.05	
15-Feb-12	30.9	7	0	340																
16-Feb-12	32	1.9	0	340																
17-Feb-12	39	19	T	340																
18-Feb-12	30.9	9	0.01	340																
19-Feb-12	33.1	5	0	340																
20-Feb-12	30	12.9	0	340	35.5	7.61	0.91	0.32	0.07											
21-Feb-12	43	23	T	340																
22-Feb-12	42.1	23	0.04	340																
23-Feb-12	30	21.9	0.01	340																
24-Feb-12	37.9	21	0	340																
25-Feb-12	33.1	19	0.02	340																
26-Feb-12	27	19	0	340																
27-Feb-12	30.9	8.1	0	340	115	24.67	0.59	0.23	0.05											
28-Feb-12	34	3.9	0	340						5428.09	5427.39		5426.24	5426.28	5426.55	5428.88	5428.81		5428.86	
1-Mar-12	28	8.1	0.03	340																
2-Mar-12	28.9	9	T	340																
3-Mar-12	43	21.9	0	340																
4-Mar-12	51.1	28.9	0	340																
5-Mar-12	52	30	0	340	126	27.03	0.70	0.86	0.18											
6-Mar-12	45	7	0.02	340																
7-Mar-12	33.1	1	0	340																
8-Mar-12	44.1	10	0	340																
9-Mar-12	59	21	0	340																
10-Mar-12	59	21	0	340																
11-Mar-12	53.1	24.1	T	340																
12-Mar-12	46	23	0	340	94.5															

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BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRT-PZ-01	NCRT-PZ-02	NCRT-PZ-03	NCRT-PZ-04	MW-F-01	MW-A-99	NHRT-PZ-04	MW-H-95	NHRT-MH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
5-Sep-12	75	32	0	340																
6-Sep-12	69.1	41	T	340																
7-Sep-12	75	32	0	340																
8-Sep-12	80.1	33.1	0	340																
9-Sep-12	84	35.1	T	340																
10-Sep-12	73	39	0	340	153	32.82	0.77	0.65	0.14											
11-Sep-12	60.1	32	0	340																
12-Sep-12	63	24.1	0	340																
13-Sep-12	78.1	26.1	0	340																
14-Sep-12	80.1	30	0	340																
15-Sep-12	77	34	0	340																
16-Sep-12	62.1	37.9	0.02	340																
17-Sep-12	72	30.9	0	340	152	32.60	0.75	0.43	0.09											
18-Sep-12	79	30.9	0	340																
19-Sep-12	78.1	34	0	340																
20-Sep-12	77	33.1	0	340																
21-Sep-12	79	35.1	0	340																
22-Sep-12	79	37.9	0	340																
23-Sep-12	75	39.9	0	340																
24-Sep-12	73.9	42.1	0	340	111	23.81	0.66	0.35	0.08											
25-Sep-12	72	36	0	340						5428.28	5427.65		5426.71	5426.71	5426.97	5429.18	5428.95		5429.14	
26-Sep-12	72	34	0	340																
27-Sep-12	75	34	0	340																
28-Sep-12	75	34	T	340																
29-Sep-12	70	44.1	T	340																
30-Sep-12	70	37	0	340																
1-Oct-12	75	30.9	0	340	57.7	12.38	0.70	0.41	0.09											
2-Oct-12	70	39.9	0	340																
3-Oct-12	42.1	25	T	340																
4-Oct-12	42.1	18	0	340																
5-Oct-12	43	19	0	340						5428.39	5427.75		5426.80	5426.79	5427.03	5429.23	5429.01		5429.19	
6-Oct-12	48	12.9	0	340																
7-Oct-12	60.1	15.1	0	340																
8-Oct-12	60.1	23	0	340	112	24.02	0.80	0.43	0.09											
9-Oct-12	55.9	27	0	340																
10-Oct-12	66	23	0	340																
11-Oct-12	61	24.1	0	340																
12-Oct-12	70	23	0	340																
13-Oct-12	54	39.9	0.02	340																
14-Oct-12	63	36	0	340																
15-Oct-12	57.9	42.1	T	340	93.5	20.06	0.75	0.41	0.09											
16-Oct-12	57.9	35.1	0.21	340																
17-Oct-12	45	30	0	340																
18-Oct-12	57	18	0	340						5428.38	5427.73		5426.73	5426.72	5426.99	5429.29	5429.09		5429.24	
19-Oct-12	61	28	0.03	340																
20-Oct-12	50	32	0.04	340																
21-Oct-12	46	27	0	340																
22-Oct-12	39.9	21	0.02	340	107	22.95	0.73	0.36	0.08											
23-Oct-12	37	19	T	340																
24-Oct-12	37.9	12	0	340																
25-Oct-12	30.9	19.9	0.01	340																
26-Oct-12	35.1	14	0	340																

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
27-Oct-12	41	25	0.02	340																
28-Oct-12	53.1	33.1	0.01	340																
29-Oct-12	57	37	0	340	71.1	15.25	0.87	0.43	0.09											
30-Oct-12	59	28.9	0	340						5428.45	5427.79		5426.78	5426.78	5427.04	5429.33	5429.21		5429.35	
31-Oct-12	64.9	30.9	0	340																
1-Nov-12	55	32	0	340																
2-Nov-12	48	24.1	T	340																
3-Nov-12	54	21	0	340																
4-Nov-12	53.1	39.9	0	340																
5-Nov-12	62.1	33.1	0	340	118	25.31	1.01	0.38	0.08											
6-Nov-12	64	26.1	0	340																
7-Nov-12	60.1	26.1	T	340																
8-Nov-12	30	21.9	0.32	340																
9-Nov-12	24.1	7	0.3	340																
10-Nov-12	10.9	-11	0.01	340																
11-Nov-12	21	-6	T	340																
12-Nov-12	32	-4	0	340	107.6	23.08	0.60	0.32	0.07											
13-Nov-12	37.9	19.9	0	340																
14-Nov-12	39	14	0	340																
15-Nov-12	35.1	5	0	340																
16-Nov-12	34	9	0.06	340																
17-Nov-12	44.1	15.1	0	340																
18-Nov-12	43	18	0.01	340																
19-Nov-12	42.1	14	0	340	120	25.74	0.83	0.32	0.07											
20-Nov-12	46	42.1	0	340																
21-Nov-12	45	26.1	0.18	340																
22-Nov-12	32	17.1	0	340																
23-Nov-12	43	15.1	0	340																
24-Nov-12	43	27	T	340																
25-Nov-12	32	8.1	0.04	340																
26-Nov-12	26.1	1	0	340	83.7	17.95	0.52	0.48	0.10											
27-Nov-12	28.9	1.9	0	340																
28-Nov-12	36	12	0	340						5428.42	5427.75		5426							





BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRT-PZ-01	NCRT-PZ-02	NCRT-PZ-03	NCRT-PZ-04	MW-F-01	MW-A-99	NHRT-PZ-04	MW-H-95	NHRT-MH-02	PZ-N5-03
	(°F)	Temp (°F)	(inch)	(gpm)	PCP (ppb)	PCP (g/s)	PCP (ppb)	PCP (ppb)	PCP (g/s)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
1-Apr-13	57	27.1	0	340	100	21.45	0.66	0.31	0.07											
2-Apr-13	62.1	24.3	0	340																
3-Apr-13	57.9	30.2	0	340																
4-Apr-13	60.1	27.1	0	340																
5-Apr-13	54	37	0.02	340																
6-Apr-13	50	31.1	0	340																
7-Apr-13	46.9	29.1	0.08	340																
8-Apr-13	29.1	16.2	0	340	84.9	18.21	0.56	0.33	0.07											
9-Apr-13	43	12.2	0	340																
10-Apr-13	54	19.2	0.02	340																
11-Apr-13	48	30.2	0.01	340																
12-Apr-13	51.1	21.2	0	340																
13-Apr-13	42.1	25.2	0	340																
14-Apr-13	35.1	19.2	0.04	340																
15-Apr-13	30.2	15.3	0	340	95.8	20.55	0.92	0.32	0.07											
16-Apr-13	30.2	16.2	0	340																
17-Apr-13	37	12.2	0	340																
18-Apr-13	46	13.1	0	340																
19-Apr-13	48.9	30.2	0.01	340																
20-Apr-13	48.9	35.1	0.01	340																
21-Apr-13	46.9	18.1	0.03	340																
22-Apr-13	31.1	16.2	0.01	340	81.2	17.42	0.55	0.33	0.07											
23-Apr-13	41	10.2	0	340																
24-Apr-13	55.9	19.2	0	340																
25-Apr-13	59	32	0	340																
26-Apr-13	66	24.3	0	340																
27-Apr-13	66.9	34	0	340																
28-Apr-13	57.9	39	0	340																
29-Apr-13	50	28.2	0.01	340	81.1	17.40	0.65	0.32	0.07	5427.95	5427.24		5426.14	5426.14	5426.41	5428.32	5428.04	5428.22	5427.43	
30-Apr-13	37.9	20.1	0	340																
1-May-13	44.1	23.2	0	340																
2-May-13	62.1	15.3	0	340																
3-May-13	51.1	35.1	0.04	340																
4-May-13	51.1	37	0	340																
5-May-13	63	28.2	0	340																
6-May-13	70	29.1	0	340	96.5	20.70	0.64	0.33	0.07											
7-May-13	71.1	32	0	340																
8-May-13	71.1	33.1	0	340																
9-May-13	72	34	0	340																
10-May-13	72	33.1	0	340																
11-May-13	73.9	36	0.01	340																
12-May-13	81	37.9	0	340																
13-May-13	81	42.1	0	340	85.4	18.32	0.84	0.36	0.08											
14-May-13	69.1	41	0	340																
15-May-13	68	36	0	340																
16-May-13	59	44.1	0.2	340																
17-May-13	48.9	39.9	0.24	340																
18-May-13	55.9	42.1	0.03	340																
19-May-13	51.1	43	0	340																
20-May-13	57	44.1	0.01	340	58.2	12.48	0.53	0.38	0.08											
21-May-13	66.9	34	0.02	340																
22-May-13	60.1	33.1	0.47	340						5427.92	5427.22		5426.13	5426.13	5426.40	5428.28	5428.02	5428.21	5427.43	

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRMTM-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
4-Sep-13	80.1	53.1	0	335																
5-Sep-13	78.1	50	0	335																
6-Sep-13	86	48.9	0	335																
7-Sep-13	79	51.1	0.11	335																
8-Sep-13	73	46.9	0	335																
9-Sep-13	69.1	39.9	0	335	62.7	13.25	1.47	0.69	0.15											
10-Sep-13	77	37.9	0	335																
11-Sep-13	79	39	0	335																
12-Sep-13	77	52	0	335																
13-Sep-13	79	48.9	0.29	335																
14-Sep-13	72	52	0	335																
15-Sep-13	73	54	0	335																
16-Sep-13	75.9	48.9	0.03	340	61.1	13.11	22.80	11.10	2.38											
17-Sep-13	55.9	39.9	0.45	340																
18-Sep-13	52	41	0.12	340																
19-Sep-13	61	34	0	340																
20-Sep-13	72	30.2	0	340																
21-Sep-13	75	34	0	340																
22-Sep-13	61	42.1	0.1	340																
23-Sep-13	59	39.9	0	340	89.1	19.11	31.10	10.20	2.19											
24-Sep-13	50	35.1	0.57	340																
25-Sep-13	44.1	32	0.69	340																
26-Sep-13	39	30.2	0.07	340						5428.82	5428.08		5427.05	5427.03	5427.26	5429.06	5428.80	5428.95	5428.66	
27-Sep-13	46	21.2	0	340																
28-Sep-13	55	39.9	0	340																
29-Sep-13	55.9	37.9	0.11	340																
30-Sep-13	50	33.1	0.38	340	80.7	17.31	22.20	5.10	1.09											
1-Oct-13	52	27.1	0	325						5429.00	5428.27		5427.32	5427.29	5427.49	5428.90	5428.66	5428.80	5428.53	
2-Oct-13	48.9	30.2	0.03	325																
3-Oct-13	37	30.2	0.03	325																
4-Oct-13	42.1	25.2	0	325																
5-Oct-13	55	20.1	0	325																
6-Oct-13	64	26.2	0	325																
7-Oct-13	66.9	27.1	0	325	83.8	17.18	30.00	3.79	0.78	5428.90	5428.21		5427.29	5427.27	5427.49	5428.76	5428.51	5428.64	5428.34	
8-Oct-13	46.9	29.1	0	325																
9-Oct-13	52	25.2	0	325																
10-Oct-13	51.1	24.3	0	325																
11-Oct-13	48.9	24.3	0	325																
12-Oct-13	46.9	21.2	0	325																
13-Oct-13	45	24.3	0	325																
14-Oct-13	42.1	26.2	0.11	315	71.7	14.25	9.74	0.30	0.06	5428.79	5428.10		5427.18	5427.17	5427.38	5428.72	5428.48	5428.60	5428.32	
15-Oct-13	48.9	16.2	0	315																
16-Oct-13	46.9	19.2	0	315																
17-Oct-13	43	30.2	0	315																
18-Oct-13	52	23.2	0	315																
19-Oct-13	57.9	21.2	0	315																
20-Oct-13	54	28.2	0	315																
21-Oct-13	59	22.1	0	315	71.6	14.23	14.60	0.23	0.05	5428.67	5427.99		5427.06	5427.04	5427.25	5428.67	5428.43	5428.57	5428.27	
22-Oct-13	64	21.2	0	315																
23-Oct-13	61	21.2	0	315																
24-Oct-13	64	22.1	0	315																
25-Oct-13	62.1	21.2	0	315																



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Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
		Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
7-Feb-14	26.2	-12.8	0	295																
8-Feb-14	15.3	4.1	0.08	295																
9-Feb-14	16.2	1.2	0.09	295																
10-Feb-14	35.1	3.2	T	290	66.6	12.19	1.07	0.20	0.04											
11-Feb-14	35.1	12.2	0.02	290																
12-Feb-14	42.1	13.1	T	290																
13-Feb-14	39.9	21.2	0.03	290																
14-Feb-14	39	18.1	0.02	290																
15-Feb-14	42.1	13.1	T	290																
16-Feb-14	45	20.1	0.03	290																
17-Feb-14	41	19.2	T	280	66.8	11.80	0.30	0.20	0.04											
18-Feb-14	37.9	31.1	0	280																
19-Feb-14	37	19.2	0.01	280																
20-Feb-14	30.2	9.1	T	280																
21-Feb-14	28.2	16.2	0.02	280																
22-Feb-14	20.1	11.1	0.01	280																
23-Feb-14	21.2	13.1	0.08	280																
24-Feb-14	17.2	6.3	0.03	280	32	5.65	0.33	0.20	0.04											
25-Feb-14	20.1	-12.8	0.1	280																
26-Feb-14	23.2	-18.8	0	280						5427.65	5426.98		5426.01	5426.02	5426.28	5428.87	5428.74	5428.85	5428.62	
27-Feb-14	35.1	2.1	0.01	280																
28-Feb-14	29.1	-3.8	0.07	280																
1-Mar-14	-1.8	-8.9	0.03	280																
2-Mar-14	39.9	-3.8	T	280																
3-Mar-14	42.1	25.2	0.14	280	47.2	8.34	0.27	0.20	0.04											
4-Mar-14	42.1	19.2	0	280																
5-Mar-14	45	22.1	T	280																
6-Mar-14	44.1	30.2	0.21	280																
7-Mar-14	41	27.1	T	280																
8-Mar-14	46.9	12.2	0	280																
9-Mar-14	48.9	32	0	280																
10-Mar-14	39.9	30.2	0.35	280	77.2	13.64	0.35	0.20	0.04											
11-Mar-14	37.9	21.2	0.02	280																
12-Mar-14	44.1	14.2	0	280																
13-Mar-14	46	13.1	0	280																
14-Mar-14	45	17.2	0.01	280																
15-Mar-14	43	25.2	0	280																
16-Mar-14	55	23.2	0	280																
17-Mar-14	46.9	25.2	T	280	69.1	12.21	0.26	0.20	0.04											
18-Mar-14	35.1	17.2	0	280																
19-Mar-14	42.1	15.3	0	280																
20-Mar-14	37	20.1	T	280																
21-Mar-14	31.1	10.2	0	280																
22-Mar-14	34	11.1	T	280																
23-Mar-14	37.9	21.2	T	280																
24-Mar-14	44.1	15.3	0	280	61.1	10.79	0.21	0.20	0.04											
25-Mar-14	57.9	22.1	0	280																
26-Mar-14	41	27.1	0.03	280																
27-Mar-14	39.9	23.2	0.01	280						5428.20	5427.51		5426.59	5426.59	5426.84	5428.87	5428.76	5428.87	5428.61	
28-Mar-14	46	27.1	0	280																
29-Mar-14	42.1	32	0.16	280																
30-Mar-14	39.9	22.1	0.24	280																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp	(inch)	(gpm)	PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)			(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
31-Mar-14	37.9	21.2	0.05	280		67.3	11.89	0.21	0.20	0.04										
1-Apr-14	44.1	17.2	0	280																
2-Apr-14	43	26.2	T	280																
3-Apr-14	46.9	20.1	0	280																
4-Apr-14	46.9	28.2	T	280																
5-Apr-14	45	29.1	T	280																
6-Apr-14	46.9	34	T	280																
7-Apr-14	55.9	30.2	0	280	54.9	9.70	0.25	0.20	0.04											
8-Apr-14	64	27.1	0	280																
9-Apr-14	55.9	30.2	T	280																
10-Apr-14	55	26.2	0	280																
11-Apr-14	59	26.2	0	280																
12-Apr-14	48.9	22.1	T	280																
13-Apr-14	37.9	19.2	T	280																
14-Apr-14	55.9	13.1	0	280	64.9	11.46	0.54	0.20	0.04											
15-Apr-14	46	31.1	T	280																
16-Apr-14	45	27.1	0	280																
17-Apr-14	57	28.2	0	280																
18-Apr-14	51.1	26.2	0.21	280																
19-Apr-14	61	20.1	0	280																
20-Apr-14	55	34	0	280																
21-Apr-14	64.9	24.3	0	280	58.4	10.32	0.22	0.20	0.04											
22-Apr-14	63	32	0.51	280																
23-Apr-14	41	29.1	T	280																
24-Apr-14	48	31.1	0.08	280																
25-Apr-14	53.1	33.1	0.48	280																
26-Apr-14	44.1	32	0.07	280																
27-Apr-14	45	27.1	T	280																
28-Apr-14	42.1	29.1	T	280	65.9	11.64	0.23	0.20	0.04	5428.39	5427.69		5426.77	5426.77	5427.00	5428.97	5428.85	5428.96	5428.74	
29-Apr-14	51.1	23.2	0	280																
30-Apr-14	61	22.1	0	280																
1-May-14	69.1	27.1	0	280																
2-May-14	70	37	0	280																
3-May-14	64	37	0	280																
4-May-14	57	33.1	0.07	280																
5-May-14	52	32	0.08	280	51.1	9.03	0.23	0.20	0.04											
6-May-14	48.9	32	T	280																
7-May-14	44.1	28.2	T	280																
8-May-14	57.9	21.2	0	280																
9-May-14	51.1	34	0.09	280																
10-May-14	37.9	28.2	0.17	280																
11-May-14	42.1	25.2	0.14	280																
12-May-14	50	19.2	T	280	61.4	10.85	0.21	0.20	0.04											
13-May-14	59	24.3	0	280																
14-May-14	64	27.1	0	280																
15-May-14	73	31.1	0	280																
16-May-14	64.9	37	0.01	280																
17-May-14	66.9	39.9	0.09	280																
18-May-14	51.1	37	0.12	280																
19-May-14	55.9	32	0	280	46.7	8.25	0.25	0.20	0.04											
20-May-14	64.9	30.2	T	280																
21-May-14	71.1	33.1	0	280																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

[illegible]

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTTPZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
13-Jul-14	88	51.1	T	275																
14-Jul-14	80.1	57	0.02	275	53.9	9.35	0.25	0.20	0.03											
15-Jul-14	75	51.1	0.16	275																
16-Jul-14	82	45	0	275																
17-Jul-14	86	46.9	T	275																
18-Jul-14	82.9	45	0	275																
19-Jul-14	82.9	46	0	275																
20-Jul-14	84.9	52	0	275																
21-Jul-14	73	54	0.16	275	55.5	9.63	2.36	0.20	0.03											
22-Jul-14	84	54	0.09	275																
23-Jul-14	86	54	0.02	275																
24-Jul-14	73	46.9	0	275																
25-Jul-14	75	36	0	275																
26-Jul-14	80.1	37	0	275																
27-Jul-14	87.1	39.9	0	275																
28-Jul-14	86	46.9	0	275	54.6	9.47	0.35	0.20	0.03											
29-Jul-14	84	48	T	275																
30-Jul-14	82.9	50	T	275																
31-Jul-14	84	45	T	275																
1-Aug-14	86	48	0	275						5428.13	5427.50	5427.36	5426.65	5426.68	5426.88	5428.79	5428.59	5428.71	5428.45	5428.36
2-Aug-14	82	48.9	0.24	275																
3-Aug-14	82.9	50	0	275																
4-Aug-14	73.9	50	T	275	64.3	11.16	0.38	0.20	0.03											
5-Aug-14	81	46	0	275																
6-Aug-14	82	48	0	275																
7-Aug-14	84.9	46.9	0	275																
8-Aug-14	79	48	0.01	275																
9-Aug-14	80.1	43	0	275																
10-Aug-14	86	46	0	275																
11-Aug-14	89.1	46	0	275	98.8	17.14	0.77	0.80	0.14											
12-Aug-14	87.1	51.1	0.26	275																
13-Aug-14	82	52	0.59	275																
14-Aug-14	75.9	54	0.01	275																
15-Aug-14	72	48.9	0.36	275																
16-Aug-14	72	51.1	0.06	275																
17-Aug-14	77	43	0	275																
18-Aug-14	81	44.1	0	275	107	18.56	1.32	0.36	0.06											
19-Aug-14	80.1	45	0.01	275																
20-Aug-14	73	46	0.02	275																
21-Aug-14	68	48.9	0.17	275																
22-Aug-14	64	46.9	0.42	275																
23-Aug-14	50	43	0.77	275																
24-Aug-14	55	43	0.01	275																
25-Aug-14	64.9	43	0	275	116	20.13	1.02	0.39	0.07											
26-Aug-14	73	41	0	275																
27-Aug-14	78.1	41	0	275																
28-Aug-14	81	43	0	275						5428.50	5427.83		5426.97	5426.97	5427.20	5429.15	5428.98	5429.11	5428.91	
29-Aug-14	80.1	43	T	275																
30-Aug-14	64	46.9	0.12	275																
31-Aug-14	64	43	0.02	275																
1-Sep-14	66.9	37.9	0	275																
2-Sep-14	75	35.1	0	275	124	21.51	0.91	0.35	0.06											

[illegible]

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

[illegible]



[illegible]

[illegible]

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NC RTPZ-01	NC RTPZ-02	NC RTPZ-03	NC RTPZ-04	MW-F-01	MW-A-99	NH RTPZ-04	MW-H-95	NH RTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
30-Mar-15	64	28.2	0	350	36.9	8.15	<0.2	0.20	0.04	5426.39	5425.51		5423.74	5423.79	5424.31	5427.77	5427.70	5427.85	5427.33	5426.89
31-Mar-15	66	30.2	0	350																
1-Apr-15	37.9	22.1	T	350																
2-Apr-15	37.9	20.1	T	350						5426.39	5425.52	5425.28	5423.75	5423.82	5424.33	5427.78	5427.69	5427.85	5427.49	
3-Apr-15	46	11.1	0	350																
4-Apr-15	45	22.1	T	350																
5-Apr-15	39.9	25.2	0.14	350																
6-Apr-15	42.1	24.3	0.01	350	30.7	6.78	<0.2	0.20	0.04											
7-Apr-15	48.9	17.2	0	350																
8-Apr-15	46.9	21.2	0.01	350																
9-Apr-15	50	23.2	T	350																
10-Apr-15	55	22.1	0	350																
11-Apr-15	55	30.2	0.01	350																
12-Apr-15	44.1	25.2	T	350																
13-Apr-15	64	20.1	0	350	32.5	7.18	<0.2	0.20	0.04											
14-Apr-15	51.1	27.1	0.11	350																
15-Apr-15	39.9	25.2	T	350																
16-Apr-15	55.9	17.2	0	350																
17-Apr-15	64	23.2	0	350																
18-Apr-15	57	27.1	0	350																
19-Apr-15	55.9	22.1	0	350																
20-Apr-15	62.1	23.2	0	350	27.6	6.09	0.21	0.20	0.04											
21-Apr-15	66.9	26.2	0	350																
22-Apr-15	66	30.2	0.07	350																
23-Apr-15	63	31.1	0.01	350																
24-Apr-15	44.1	33.1	0.35	350																
25-Apr-15	46.9	31.1	T	350																
26-Apr-15	39.9	30.2	0.17	350																
27-Apr-15	57	25.2	0	350	28.9	6.38	<0.2	0.20	0.04											
28-Apr-15	72	28.2	0	350																
29-Apr-15	70	34	T	350						5426.52	5425.65		5423.88	5423.95	5424.44	5427.76	5427.53	5427.70	5427.31	
30-Apr-15	60.1	35.1	0	350																
1-May-15	66	27.1	0	350																
2-May-15	64	35.1	0	350																
3-May-15	64	25.2	0	350																
4-May-15	71.1	35.1	0	350	28.3	6.25	<0.2	0.20	0.04											
5-May-15	61	35.1	0.13	350						5427.12	5426.41		5425.34	5425.33	5425.54	5428.54	5428.25	5428.39	5428.12	
6-May-15	55	37	T	350																
7-May-15	44.1	34	0.01	350																
8-May-15	52	26.2	0	350																
9-May-15	54	34	0	350																
10-May-15	57	23.2	0	350																
11-May-15	59	27.1	0	285	40.2	7.23	0.27	0.20	0.04											
12-May-15	59	37.9	0.17	285																
13-May-15	63	39	T	285																
14-May-15	62.1	34	0.13	285																
15-May-15	55.9	43	0.19	285																
16-May-15	45	39	0.48	285																
17-May-15	43	35.1	T	285																
18-May-15	50	34	0	285	44.4	7.98	0.56	0.20	0.04											
19-May-15	52	39.9	0	285																
20-May-15	62.1	39.9	0	285																

Day	High	Low	Precip.	Flow	Carbon Influent	Mass Flow	BABB	Carbon Effluent	Mass Flow	MW-I-96	NCRTPZ-01	NCRTPZ-02	NCRTPZ-03	NCRTPZ-04	MW-F-01	MW-A-99	NHRTMZ-04	MW-H-95	NHRTMH-02	PZ-N5-03
	Temp	Temp			PCP	PCP	PCP	PCP	PCP	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
	(°F)	(°F)	(inch)	(gpm)	(ppb)	(g/s)	(ppb)	(ppb)	(g/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
21-May-15	63	37.9	T	285																
22-May-15	64	34	T	285																
23-May-15	60.1	39	T	285																
24-May-15	60.1	44.1	0.02	285																
25-May-15	69.1	34	0.1	285																
26-May-15	68	43	0.17	285	38.8	6.98	0.27	0.20	0.04											
27-May-15	57.9	45	0.07	285						5427.96	5427.29		5426.40	5426.40	5426.63	5428.61	5428.32	5428.47	5428.20	
28-May-15	61	43	0.05	285																
29-May-15	68	42.1	T	285																
30-May-15	64.9	44.1	T	285																
31-May-15	75	42.1	0.24	285																
1-Jun-15	69.1	44.1	0.14	285	45.1	8.11	0.53	0.20	0.04											
2-Jun-15	64.9	39	0.02	285																
3-Jun-15	66	37	0.04	285																
4-Jun-15	66.9	39.9	0.15	285																
5-Jun-15	71.1	41	0	285																
6-Jun-15	77	43	0	285																
7-Jun-15	80.1	44.1	0	285																
8-Jun-15	87.1	46.9	0	285	48.9	8.79	0.37	0.20	0.04											
9-Jun-15	88	46	0.22	285																
10-Jun-15	73.9	53.1	T	285																
11-Jun-15	80.1	46.9	0	285																
12-Jun-15	75.9	45	0	285																
13-Jun-15	72	37.9	0	285																
14-Jun-15	64.9	33.1	0	285																
15-Jun-15	70	43	0.07	285	39.6	7.12	0.24	0.20	0.04											
16-Jun-15	75.9	42.1	0.06	285																
17-Jun-15	75.9	45	0	285																
18-Jun-15	80.1	44.1	0	285																
19-Jun-15	75.9	45	0.01	285																
20-Jun-15	75	39	0	285																
21-Jun-15	75.9	39	0.02	285																
22-Jun-15	72	42.1	0	285	39.5	7.10	0.64	0.20	0.04											
23-Jun-15	79	43	0	285																
24-Jun-15	80.1	45	T	285																
25-Jun-15	82	53.1	0	285						5427.73	5427.02	5426.93	5426.67	5426.68	5426.91	5428.70	5428.44	5428.60	5428.43	
26-Jun-15	91	45	0	285																
27-Jun-15	93.9	48.9	0	285																
28-Jun-15	95	52	0	285																
29-Jun-15	93	60.1	0.17	285	42	7.55	0.41	0.20	0.04											
30-Jun-15	88	57	0.03	285																
1-Jul-15	87.1	51.1	0	285																
2-Jul-15	88	50	0	285																
3-Jul-15	89.1	52	0	285																
4-Jul-15	90	48	0	285																
5-Jul-15	72	51.1	0	285																
6-Jul-15	81	50	0	285	50.6	9.10	0.23	0.20	0.04	5427.69	5426.99	5426.90	5426.68	5426.70	5426.92	5428.59	5428.32	5428.49	5428.28	
7-Jul-15	78.1	43	0.05	285																
8-Jul-15	78.1	43	0	285																
9-Jul-15	82	44.1	0	285																
10-Jul-15	78.1	52	0.02	285																
11-Jul-15	73	53.1	0.1	285																

BABB: between carbon samples, MW: monitoring well, DWL: depth to water level, NCRT: near creek recovery trench, PZ: piezometer, NHRT: near highway recovery trench, MH: manhole

[illegible]

## **Appendix B. Quality Assurance**

**MBMG Organic Laboratory**  
Data Report

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ORDER # : 101161

Lab ID	Field ID	2,4,6-tribromophenol		2,3,4,5,6-pentachlorophenol		Date	Date	Date		Analysis	Days	Days	Days
		Surrogate ug/L	Recovery	Analyte (ug/L)	Qualifier	Sampled	Recd	Extracted	Method	Date/By	Ext	Anal	Ext-Anal
207159	IN061614	14.2	71%	49.2	D	6/16/2014	6/23/2014	6/27/2014	528	6/27/2014 jrt	4	4	0
207160	BABB061614	17.2	86%	0.300		6/16/2014	6/23/2014	6/27/2014	528	6/27/2014 jrt	4	4	0
207161	EFF061614	17.1	85%	0.2	U	6/16/2014	6/23/2014	6/27/2014	528	6/27/2014 jrt	4	4	0
207162	OPOQVS061614	18.0	90%	0.2	U	6/16/2014	6/23/2014	6/27/2014	528	6/27/2014 jrt	4	4	0
207163	WTPVS062314	15.9	80%	0.2	U	6/23/2014	6/23/2014	6/27/2014	528	6/27/2014 jrt	4	4	0
207164	IN062314	18.9	94%	67.0	D	6/23/2014	6/23/2014	6/27/2014	528	6/27/2014 jrt	4	4	0
207165	BABB062314	17.8	89%	0.211		6/23/2014	6/23/2014	6/27/2014	528	6/27/2014 jrt	4	4	0
207166	EFF062314	16.2	81%	0.2	U	6/23/2014	6/23/2014	6/27/2014	528	6/27/2014 jrt	4	4	0

Reviewed by:   JRT

**MBMG Organic Laboratory**  
Data Report

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ORDER # : 101359

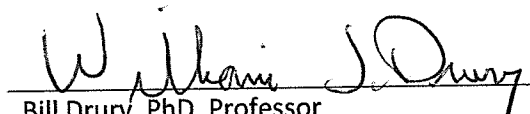
Lab ID	Field ID	2,4,6-tribromophenol		2,3,4,5,6-pentachlorophenol		Date	Date	Date		Analysis	Days	Days	Days Btwn
		Surrogate ug/L	Recovery	Analyte (ug/L)	Qualifier	Sampled	Recd	Extracted	Method	Date/By	Ext	Anal	Ext-Anal
208678	IN112414	15.9	80%	38.1	D	11/24/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208679	BABB112414	19.6	98%	0.343		11/24/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208680	EFF112414	20.4	102%	0.2	U	11/24/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208681	OPOQVS112414	19.2	96%	0.2	U	11/24/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208682	WTPVS120114	22.6	113%	183	D	12/1/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208683	IN120114	21.6	108%	39.5	D	12/1/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208684	BABB120114	17.6	88%	0.210		12/1/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208685	EFF120114	18.0	90%	0.2	U	12/1/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208686	NHRTEFF120114	20.0	100%	174	D	12/1/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0
208687	NCRTEFF120114	17.9	89%	12.2		12/1/2014	12/1/2014	12/4/2014	528	12/4/2014 jrt	3	3	0

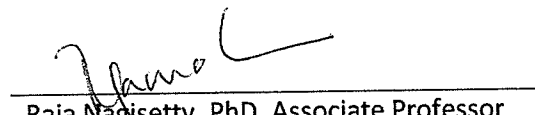
Reviewed by: JRT

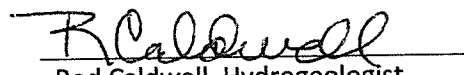


## SIGNATURE PAGE

This is to certify that the thesis prepared by Travis Dunkle entitled "Procedural Treatment Options to Address Intermittent Pentachlorophenol Effluent Exceedances at a Former Wood-Treatment Site in Butte, Montana" has been examined and approved for acceptance by the Department of Environmental Engineering, Montana Tech of The University of Montana, on this 21th day of April, 2016.

  
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